PLATE 1. ROAD PLANTING ON MAIN DRIVE LEADING TO OFFICE BUILDING, CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.
(ALL OF THESE TREES AND SHRUBS HAVE BEEN PLANTED SINCE 1887).

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	WM. SAUNDERS, LL.D.
AGRICULTURIST	J. H. GRISDALE, B. AGR.
HORTICULTURIST	W. T. MACOUN
CHEMIST	F. T. SHUTT, M.A.
ENTOMOLOGIST AND BOTANIST	JAS. FLETCHER, LL.D.
POULTRY MANAGER	A. G. GILBERT
SUPT. EXPERIMENTAL FARM, NAPPAN, N.S.	R. ROBERTSON
HORTICULTURIST " " "	W. S. BLAIR
SUPT. EXPERIMENTAL FARM, BRANDON, MAN.	S. A. BEDFORD
" " " INDIAN HEAD, N.W.T.	ANGUS MACKAY
" " " AGASSIZ, B.C.	THOS. A. SHARPE

FOR

1900

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Office Building and Museum of the Central Experimental Farm.

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, December 1, 1900.

SIR,—I beg to submit for your approval the fourteenth annual report of the work done, and in progress, at the several experimental farms.

In addition to my report, you will find appended, reports from the following officers of the Central Experimental Farm : From the Agriculturist, Mr. J. H. Grisdale ; from the Horticulturist, Mr. W. T. Macoun ; from the Chemist, Mr. Frank T. Shutt, and from the Entomologist and Botanist, Dr. James Fletcher. A report is also submitted from the Poultry Manager, Mr. A. G. Gilbert.

From the Branch Experimental Farms there are reports from Mr. R. Robertson, Superintendent, and from Mr. W. S. Blair, Horticulturist of the Experimental Farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. S. A. Bedford, Superintendent of the Experimental Farm for Manitoba, at Brandon ; from Mr. Angus Mackay, Superintendent of the Experimental Farm for the North-west Territories, at Indian Head, and from Mr. Thos. A. Sharpe, Superintendent of the Experimental Farm for British Columbia, at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical work in the fields, barns, dairy and poultry buildings, orchards and plantations at the several experimental farms ; also of scientific investigations in the chemical laboratory and the information gained from the careful study of the life histories and habits of injurious insects and the methods by which noxious weeds are propagated and spread, together with the most practical and economical measures for their destruction. In the report of the Entomologist and Botanist will also be found particulars of the experiments and observations which have been made during the past year in connection with the Apiary.

The large and constantly increasing demand by the farmers of the Dominion for the publications issued from the experimental farms is a gratifying evidence of the desire for information among this class of the community, also of the high esteem in which these records of the work of the farms are held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit-grower and that they may assist in advancing agriculture and horticulture in this country.

I have the honour to be, sir,
Your obedient servant,

WM. SAUNDERS,
Director Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT

ON THE

EXPERIMENTAL FARMS

REPORT OF THE DIRECTOR, WM. SAUNDERS, LL.D., F.R.S.C., F.L.S.

In submitting the fourteenth annual report giving particulars of some of the operations conducted on the five experimental farms established by the Dominion Government for the benefit of farmers residing in the different climates of Canada, it is hoped that the facts presented, which are the results of careful observation and experiment, will be found of much practical utility.

The reports of the several officers engaged in the different lines of work contain much information on a variety of subjects, all bearing on practical agriculture or horticulture. The best methods of maintaining the fertility of the land, and of economizing the fertilizers produced on the farm, the most useful measures to adopt in preparing the land for crop, how and when seed should be sown, and which are the varieties which experience has shown to be the best and most productive, are all referred to. Much information is also given as to the care of cattle, swine, sheep and poultry and the most economical and profitable methods to adopt in the feeding and breeding of these different classes of stock for the production of meat, dairy products and eggs. The growing of all the different classes of fruit and vegetables has received much attention and lists have been prepared of varieties found specially suitable to certain localities and climates with particular reference to the needs of farmers. The selection and care of the many different sorts of useful timber and ornamental trees adapted to Canada has received much attention, embracing such varieties as are specially suitable for shelter belts and others adapted for the beautifying of homes.

The subjugation of insect pests and noxious weeds has claimed close observation and study, so also have the many chemical problems which present themselves in connection with agricultural pursuits, the solution of which is most important to success. These with many other useful subjects are under constant investigation and experiment. By the use of such information presented from year to year, improvements have taken place in farm life, leading to the avoidance of waste, and to economy in production, with increased profits as the result.

The interdependence of all branches of farm work and a knowledge of how these can best be carried on in conjunction so as to produce the most satisfactory returns under the varied conditions which surround the settler in different parts of the Dominion, are items of information of deep interest to farmers everywhere. The days are passing by when farmers will rest satisfied with the risky position of depending entirely on one crop. With adverse seasons, which occur more or less often in almost

every country, such men on such occasions lose ground financially, and sometimes to such an extent as to take them several years to recover. The best and happily the system most generally followed now is mixed farming. This is eminently adapted to all parts of Canada, and to the rapid growth of this system of diversified agriculture may be attributed much of the phenomenal increase in the exports of Canadian agricultural products, which has taken place during the past ten or twelve years.

During the past season the writer has had an opportunity of visiting Great Britain and France, and of noting the progress of agriculture there, and the results produced by the measures which have been adopted to assist farmers in their work, further particulars of which will be found in another part of this report. The experience gained but strengthens the opinion that Canadian farmers are well to the front in almost everything, and that there is no other country where there are so many useful measures in operation designed to assist the farmer in overcoming the difficulties he has to contend with, and to aid him in his endeavours to acquire a better practical knowledge of the important principles which underlie his useful occupation. It is gratifying to know that the farmers of this country are eager for information and always ready to take advantage promptly of every opportunity of improving their condition. With such a spirit of enterprise abroad and the enormous agricultural resources awaiting development in Canada, the future prosperity of the country is assured.

This fourteenth annual report of the work of the experimental farms is submitted to the farmers of Canada with the earnest hope that it may prove helpful to them in the great work they have in hand of advancing the agricultural interests of this country.

EXPERIMENTAL WORK

CONDUCTED AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, ONTARIO.

EXPERIMENTS WITH OATS.

Eighty-two varieties of oats have been under trial in the uniform test plots at the Central Experimental Farm during 1900. These experiments have been conducted in all cases to gain information as to the relative productiveness, earliness and other characteristics of the different sorts. The soil on which these oats were sown was a sandy loam which received a dressing of barn-yard manure during the winter of 1898-9 of about 12 tons per acre. The previous crop was turnips. After the turnips were taken off the land was drilled up in ridges 2½ feet apart and left in this condition until the following spring, when it was cultivated twice with a two-horse cultivator and twice with a smoothing harrow. The seed of all the varieties was sown on May 4, on plots of one-fortieth of an acre each, seed being used in each case at the rate of 2 bushels per acre. Among the varieties tested this year were the following thirteen cross-bred sorts, all of which have been originated on the experimental farms:—Holland, Cromwell, Olive, Oxford, Pense, Miller, Brandon, Milford, King, Medal, Kendal, Master and Russell. Waverley and Tartar King are two new cross-bred oats recently introduced by Garton Bros., of Newton le Willows, England. Longhoughton is a favourite Scotch variety, and Anderbecker, Leutewitzer, Selchower and Uberfluss have been received for test from Germany.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.		Bush.	Lbs.	Lbs.	
1	Holstein Prolific.....	Aug. 14	102	46—49	Stiff......	7½— 9½	Branching	82	18	35½	Slightly.
2	White Giant.........	" 14	102	45—48	"	8 — 9½	" .	78	8	36¼	"
3	Black Beauty..	" 16	104	44—48	Weak ..	9 —10	" .	76	16	33½	Considerably.
4	Hazlett's Seizure....	" 16	104	48—52	Stiff......	8 — 9½	" .	74	24	36¼	Slightly.
5	Waverley...........	" 14	102	48—52	"	8 — 9½	" .	74	4	37	"
6	Oderbruch...........	" 15	103	45—49	"	8 — 9½	Half Sided	73	32	39	"
7	Calif'nia P. Blk. C.E.F	" 20	108	50—54	"	9 —10	Sided.....	72	32	32¼	Considerably.
8	Joanette.............	" 24	112	38—42	"	7 — 8	Branching	70	20	38	Slightly.
9	Early Blossom.......	" 17	105	47—51	"	7½— 8½	Half Sided	70	20	35½	"
10	Golden Tartarian	" 22	110	46—50	"	9 —10	Sided.....	69	14	33	"
11	Golden Giant........	" 22	110	36—40	"	9 —10	"	68	28	35	Considerably.
12	Holland............	" 22	110	36—40	"	9 —10	"	68	8	35	"
13	Cromwell............	" 14	102	48—52	"	9 —10	Half Sided	68	8	38½	Slightly.
14	American Beauty....	" 14	102	44—48	Medium..	8½—9½	Branching	68	8	36	"
15	Olive	" 17	105	44—48	Stiff......	9 —10	Half Sided	67	22	35¾	"
16	Eureka.........	" 11	99	40—44	"	8½—10	Branching	67	22	37	"
17	Buckbee's Illinois....	" 13	101	45—48	"	8½— 9½	" .	67	2	40¼	"
18	Oxford	" 16	102	46—50	"	8 — 9	Half Sided	65	30	38	"

OATS—TEST OF VARIETIES—*Continued.*

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.		Bush.	Lbs.	Lbs.	
19	Bavarian	Aug. 22	110	46—50	Stiff	9 —10½	Branching	65	10	32½	Considerably.
20	Blk. Tartarian, C. E. F.	" 20	108	50—54	"	8½— 9½	Sided.	64	24	38	Slightly.
21	Banner	" 16	104	46—50	"	9 —10	Branching	64	4	36	"
22	Wide Awake	" 18	106	47—51	"	8 — 9½	"	63	18	38½	"
23	Uberfluss	" 14	102	44—48	"	7½— 8½	"	63	18	36½	"
24	Mennonite	" 19	107	40—46	Medium	7½— 8½	"	63	8	37	Considerably.
25	Imp. Ligowo, C. E. F.	" 14	102	45—49	Stiff	8½— 9½	"	62	12	37	Slightly,
26	Wallis	" 16	104	46—50	"	9 —10	"	62	12	35	"
27	Early Archangel	" 14	102	46—50	"	8½— 9½	"	61	7	41½	"
28	White Schonen	" 16	104	48—52	"	8½— 9½	"	61	6	37	"
29	Early Golden Prolific.	" 17	105	43—47	Medium	8½— 9½	"	61	6	34½	Considerably.
30	Flying Scotchman	" 11	99	46—50	Stiff	9 —10½	"	61	6	38¾	Slightly.
31	Pense	" 17	105	46—50	"	8½— 9½	Half Sided	61	6	36	Considerably.
32	Tartar King	" 10	98	38—42	"	9 -10	Sided.	60	20	35	Slightly.
33	Improved Ligowo Imp.	" 14	102	45—49	"	8½— 9½	Branching	60	—	37	"
34	Prize Cluster	" 10	98	42—46	"	7 — 8	"	60	—	41¾	"
35	New Zealand	" 25	113	46—50	"	9 —10	Sided.	60	—	35½	"
36	Welcome	" 11	99	40—45	Medium	8 — 9	Branching	60	—	39½	"
37	Prol. Blk. Tartarian Im	" 20	108	50—54	Stiff	8½— 9½	Sided.	59	14	36	"
38	Anderbecker.	" 15	103	44—48	"	8½—10	Branching	59	14	35¼	"
39	California Prol. Blk, Im	" 20	108	50—54	"	9 —10	Sided.	59	14	33	Considerably.
40	American Triumph	" 19	107	45—49	"	8 — 9½	Branching	58	28	34	Slightly.
41	Great Northern	" 15	103	35—40	"	7½— 8½	"	58	28	36¼	"
42	Thousand Dollar	" 13	101	46—49	"	8 — 9	"	58	8	38½	"
43	Danish Island	" 17	105	34—38	Weak	6½— 8	"	58	8	35	Badly.
44	Abundance	" 22	110	40—45	"	8 — 9	"	58	8	33¾	Considerably.
45	Columbus	" 14	102	36—40	Medium	7½— 8½	"	57	22	34¼	Slightly.
46	Abyssinia	" 16	104	46—50	Stiff	7 — 8	Half Sided	57	22	39	Badly.
47	Early Maine	" 14	102	40—44	Weak	7½ - 8½	Branching	57	2	37	Considerably.
48	Miller	" 16	104	46—50	Stiff	8½— 9¾	"	56	16	36½	"
49	Liberty	" 15	103	38—42	"	8 — 9	"	56	16	36	"
50	Newmarket	" 15	103	45—50	Weak	8 — 9½	"	56	16	38	"
51	Poland	" 11	99	40—45	Stiff	7½— 9	"	56	16	38	Slightly.
52	Brandon	" 22	110	44—48	"	8½—10	Half Sided	55	10	34	Considerably.
53	Lincoln	" 15	103	45—50	"	8½— 9½	Branching	55	10	36¾	Slightly.
54	Golden Beauty	" 24	112	46—50	"	8½—10	"	54	4	35	Considerably.
55	Rosedale	" 14	102	40—43	"	7½— 8½	Half Sided	54	4	40¾	"
56	Victoria Prize	" 10	98	40—45	Medium	7 — 8	Branching	54	4	42½	"
57	Milford	" 17	105	40—45	Stiff	8 —10	Half Sided	52	32	40	Slightly.
58	Bayonet	" 11	99	36—42	"	8 — 9	Branching	52	32	39½	"
59	Salines	" 25	113	40—46	"	7½— 8½	"	51	26	35	Badly.
60	Longhoughton	" 16	104	44—48	"	8 — 9	"	51	26	31½	Slightly.
61	Sensation	" 14	102	45—48	"	8 — 9½	"	51	26	38	"
62	White Russian	" 17	105	45—50	"	7½ - 8½	"	51	26	39	"
63	Early Gothland	" 14	102	45—50	"	7½— 8½	Half Sided	51	26	40¼	"
64	Imported Irish	" 13	101	45—50	Weak	8 — 9	Branching	51	26	40½	Considerably.
65	Siberian	" 20	108	46—50	Stiff	8 — 9	"	50	20	36	"
66	King	" 18	106	40—46	Medium	7½— 9	"	50	20	36	Slightly.
67	Leutewitzer	" 20	108	38—42	"	7½— 9	"	50	20	31¾	"
68	Improved American	" 17	105	44—48	Stiff	8 — 9½	"	50	20	35½	"
69	Bonanza	" 10	98	36—40	Weak	7½— 8½	"	50	20	42½	"
70	Medal	" 16	104	46—50	Stiff	8½— 9½	Half Sided	50	20	38	Considerably.
71	Kendal	" 23	111	38—42	Weak	7½— 8½	"	48	8	35¼	Badly.
72	Early Dawson	" 9	97	36—40	"	7½— 9	Branching	47	22	40½	Considerably.
73	Coulommiers	" 24	112	36—40	"	8 — 9	"	47	2	37½	Badly.
74	Selchower	" 20	108	40—46	Stiff	7 — 9	Sided.	47	2	34	Slightly.
75	Mortgage Lifter	" 10	98	36—40	"	8½—10	Branching	47	2	41¼	Considerably.
76	White Wonder	" 9	97	40—43	Weak	8 — 9	"	47	2	42	"
77	Doncaster Prize	" 16	104	39—44	"	8½— 9½	"	42	24	35¾	Badly.
78	Master	" 16	104	45—50	Stiff	8 — 9	Half Sided	42	12	37¼	Slightly.
79	Black Mesdag	" 13	101	44—47	"	8 — 9	Branching	41	6	37	Considerably.
80	Russell	" 17	105	40—45	"	8 — 9	Half Bra'h	41	6	35¾	"
81	Cream Egyptian	" 20	108	36—42	Weak	7½— 8½	Half Sided	35	30	36½	"
82	Winter Grey	" 19	107	35—40	"	6½— 8	Branching	35	10	40	Badly.

EXPERIMENTS WITH OATS GROWN AFTER DIFFERENT CROPS.

During the past season six plots, one-fortieth acre each, have been used in this test to ascertain what effect different crops have on the soil they are sown upon, and how far they influence a subsequent oat crop. The soil in this instance was a sandy loam of good quality. After the crops were taken off last autumn, the land was gang-ploughed shallow, and later in the fall it was ploughed to the depth of about 7 inches. In the spring of 1900 it was harrowed twice with disc-harrow and twice with smoothing harrow, and all sown with Sensation oats at the rate of 2 bushels per acre on May 4. They were cut on August 14, with the following results :—

Previous Crop in 1899.	Sensation Oats in 1900 Yield per acre.		Length of Straw.	Length of Head.
	Bush.	lbs.	Inches.	Inches.
Plot 1 Flax	49	14	40—45	8—9½
Plot 2 Grain	58	28	43—48	8½—9½
Plot 3 Horse Beans	69	14	46—50	9—10
Plot 4 Soja Beans	49	14	40—45	8½—9½
Plot 5 Corn	52	32	40—45	8½—9½
Plot 6 Millet	43	18	36—40	7¾—8½

EXPERIMENTS WITH BARLEY.

Fifty-nine varieties of barley have been under test in the uniform trial plots for 1900. Twenty-four of these have been two-rowed sorts and thirty-five six-rowed. The land chosen for the barley plots was a heavy sandy loam, mixed with clay. The previous crop was clover hay. The land was ploughed late in the autumn to the depth of about 7 inches and left in that condition until the following spring, when it was harrowed twice with the disc-harrow and twice with the smoothing harrow before sowing. The size of the plots was one-fortieth of an acre each, and they were all sown on May 1, the two-rowed at the rate of 2 bushels per acre and the six-rowed at the rate of 1¾ bushels per acre. The seed of all these varieties of barley, both two-rowed and six-rowed, was obtained from selected heads picked carefully by hand, the largest and plumpest being chosen.

Among the varieties tested this year are the following hybrid sorts, all of which have been produced at the experimental farms:—Sixteen two-rowed barleys: Beaver, Bolton, Gordon, Jarvis, Clifford, Harvey, Dunham, Victor, Nepean, Fulton, Sidney, Logan, Pacer, Leslie, Monck and Rigid, and twenty-one six-rowed sorts, namely : Pioneer, Royal, Argyle, Summit, Albert, Vanguard, Claude, Surprise, Success, Nugent, Trooper, Mansfield, Stella, Garfield, Empire, Phœnix, Yale, Brome, Parkin, Munro and Lytton. The last four named are new hybrids which have been introduced this year. The following is their parentage :—

No. 18. Parkin Beardless—Royal, six-rowed bearded female ; Success, six-rowed beardless male.

No. 19. Munro Bearded—Royal, six-rowed bearded female; Success, six-rowed beardless male.

No. 20. Lytton—Royal, six-rowed female; Beaver, two-rowed male.

No. 21. Pelham—Royal, six-rowed female; Beaver, two-rowed male.

Royal, the female parent of Parkin and Munro, is a hybrid between a two-rowed barley, known as Swedish, and a plump six-rowed variety, known as Baxter. Success is a beardless barley. One of the crosses, Parkin, is beardless, like the male parent; the other is bearded and resembles Royal.

In the third case, Lytton is a cross with Royal six-rowed and Beaver two-rowed. Beaver was one of the earlier hybrids, the result of a cross between a two-rowed sort (Swedish) and a six-rowed Baxter. In this case, although in parentage it is two-thirds two-rowed, this barley is, nevertheless, a six-rowed sort. Pelham is a two-rowed sort. The three parents of these hybrids have been very productive.

Nos. 18 and 19 are crosses which were made by the present Horticulturist of the Central Experimental Farm, Mr. W. T. Macoun, in 1895. Nos. 20 and 21 are the work of Dr. C. E. Saunders, in 1896.

TWO-ROWED BARLEY—TEST OF VARIETIES.

	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
					Inches.		Inches.	Bush.	Lbs.	Lbs	
1	Canadian Thorpe	Aug.	7	98	35—38	Very stiff	3—4	58	16	50	Slightly.
2	French Chevalier	"	6	97	33—36	Weak	3¼—4½	56	32	48	Badly.
3	Beaver	"	6	97	35—38	"	3—3¾	54	8	49¼	"
4	Bolton	"	4	95	33—36	Stiff	3—3¾	52	24	51¼	Slightly.
5	Danish Chevalier	"	6	97	33—36	Weak	3¼—4	51	32	49	Considerably.
6	Gordon	"	6	97	40—43	Stiff	3—3½	50	40	49¼	Slightly.
7	Jarvis	"	6	97	39—42	"	3—4	50	20	50	"
8	Newton	"	8	99	38—41	"	3—3¾	50	..	50¼	Considerably.
9	Clifford	"	6	97	38—41	"	3—4	50	..	49	Slightly.
10	Harvey	"	4	95	40—43	"	3—3¾	50	..	50	"
11	Dunham	"	8	99	40—43	"	3¼—4¼	49	8	48½	"
12	Victor	"	6	97	40—43	Medium	3¼—4	49	8	48½	Considerably.
13	Nepean	"	8	99	40—44	"	3—4	49	8	50	Slightly.
14	Fulton	"	8	99	40—43	Stiff	3—3¾	47	44	48	"
15	Sidney	"	4	95	34—38	"	3—3¾	45	..	50	"
16	Logan	"	8	99	39—42	Medium	3—4	43	16	48¾	"
17	Pacer	"	4	95	40—43	Stiff	3—3¾	43	16	50	"
18	Pelham	"	6	97	32—35	Medium	3¼—4¼	42	24	48¾	Considerably.
19	Leslie	"	6	97	35—38	Stiff	3—4	40	40	44	Slightly.
20	Kinver Chevalier	"	6	97	33—36	Weak	3—4	37	44	44	Badly.
21	Monck	"	8	99	36—40	Stiff	3—3¾	35	40	51	Considerably.
22	Improved Thanet	"	10	101	35—38	Weak	3¼—4¼	30	40	44	Badly.
23	Rigid	"	9	100	39—42	"	3¼—4¼	29	8	49¾	Considerably.
24	Prize Prolific	"	14	105	32—35	"	3—4	26	46	46	Badly.

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs	
1	Mensury.	Aug. 3	94	36—39	Stiff......	2¾—3¾	60	..	48	Slightly.
2	Pioneer	" 3	94	37—40	"	2½—3¼	60	..	45½	"
3	Common..........	July 31	91	31—34	Medium. .	2 —3	59	8	48	"
4	Salzer's Silver King.	Aug. 7	98	36—38	Stiff ...	3 —3¾	58	16	46½	"
5	Royal.............	" 2	93	30—33	Medium. .	2 —2¾	58	8	47	"
6	Argyle............	" 3	94	35—38	Stiff	2¼—3½	56	32	48	"
7	Odessa......... ..	" 2	93	33—36	Medium. .	2½—3	55	..	47	"
8	Petschora	July 31	91	33—35	" .	3 —3½	54	8	44	Considerably.
9	Summit	Aug. 4	95	31—34	Weak	2 —3	54	8	48½	"
10	Albert	" 3	94	35—38	Stiff......	2 —3	53	16	49½	"
11	Vanguard..........	" 1	92	32—34	"	2 —3¼	52	44	46	Slightly.
12	Oderbruch....... ...	" 3	94	34—37	Weak ...	2½—3¼	52	24	48½	Considerably.
13	Claude.............	" 3	94	33—36	Stiff......	2¼—3¼	51	32	45½	Slightly.
14	Surprise..... :.....	" 4	95	28—31	Weak	2 —3	51	32	47¾	Considerably.
15	Success	July 28	88	29—31	Medium. .	2 —2½	50	40	45	Slightly.
16	Parkin.............	" 31	91	28—30	Weak	2 —2½	50	40	46	Considerably.
17	Munro	" 31	91	30—32	"	2 —2¾	50	40	48	"
18	Nugent	Aug. 1	92	36—40	Stiff.....	2¾—3½	50	..	48	Slightly.
19	Blue Short Head ...	" 8	99	29—32	"	2 —2¼	50	..	43	Considerably.
20	Hulless Black	" 1	92	28—30	Weak	1½—2	48	36	60½	Slightly.
21	Trooper	" 2	93	34—37	Medium. .	2½—3¼	47	4	49	"
22	Lytton.............	" 2	93	29—32	" .	2¼—3¼	47	4	....	"
23	Excelsior	" 4	95	35—38	Stiff......	2 —3	46	32	43½	Considerably.
24	Champion..........	" 1	92	35—37	"	2½—3¼	45	40	43¾	Slightly.
25	Rennie's Improved. .	" 1	92	33—36	Medium. .	2½—3	45	20	45	"
26	Mansfield	" 2	93	37—40	" .	2½—3¼	45	..	45	"
27	Stella	" 1	92	32—34	Stiff	2 —3	43	36	45¾	"
28	Garfield	" 4	95	35—38	"	2½—3	43	36	47¾	"
29	Empire	" 2	93	34—37	"	2 —2¾	43	36	49¼	"
30	Blue Long Head ...	July 31	91	33—36	Weak	2½—3	43	16	44	Badly.
31	Baxter.......	Aug. 2	93	34—37	Medium. .	2½—3¼	41	32	47	Considerably.
32	Phœnix	" 1	92	33—36	Stiff......	2½—3	41	32	43½	Slightly.
33	Yale.	" 7	98	33—36	Medium. .	2¼—3¼	41	32	45½	Considerably.
34	Brome.....	" 3	94	33—36	"	2½—3	40	40	46½	"
35	Hulless' White . . .	" 1	92	30—33	Weak	2 —2½	39	8	53	Slightly.

BARLEY GROWN FROM SCREENED SEED.

While all the uniform trial plots of barley were grown, as already stated, from seed obtained from carefully selected heads, the seed of the following ten varieties was not from selected heads. After the barley plots were threshed, the grain for this purpose was passed through the fanning mill to take out the small kernels, and the clean, plump seed remaining was saved.

Six of these varieties were six-rowed and four were two-rowed, and the following are the results. It will be seen that in every instance but one the seed from selected heads has given the larger crops, the increase per acre varying from 40 pounds to 8 bushels and 40 pounds. The one exception was a two-rowed sort, the Danish Chevalier, which gave a crop of 2 bushels 24 pounds less per acre from the selected heads. These were all sown on the same day as the uniform trial plots, May 1; the plots were adjoining, with similar soil and similarly treated, the size in each case being one-fortieth of an acre.

RESULTS of sowing Screened Seed compared with Selected.

Number	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	From Screened Seed. — Yield per Acre.		From Selected Heads. — Yield per Acre.	
	Six-rowed.			Inches.		Inches.	Bush.	Lbs.	Bush.	Lbs.
1	Mensury	Aug. 3	....	36 to 39	Stiff	$2\frac{1}{2}$ to $3\frac{1}{2}$	56	32	60	..
2	Odessa	" 2		33 to 36	"	2 to 3	50	40	55	..
3	Royal	" 2	..	30 to 33	Medium	2 to $2\frac{1}{2}$	50	..	58	8
4	Petschora	July 31	....	33 to 35	"	$2\frac{1}{2}$ to 3	49	8	54	8
5	Champion	Aug. 1	....	35 to 37	Stiff	2 to 3	45	..	45	40
6	Trooper	" 4	...	32 to 35	"	2 to 3	43	16	47	4
	Two-rowed.									
1	Danish Chevalier	Aug. 6	....	33 to 36	Weak	$3\frac{1}{4}$ to 4	54	8	51	32
2	Beaver	" 6	...	34 to 37	"	3 to $3\frac{1}{2}$	50	..	54	8
3	Canadian Thorpe	" 7	...	35 to 38	Stiff	$2\frac{3}{4}$ to $3\frac{1}{4}$	49	28	58	16
4	Sidney	" 4	...	34 to 38	"	3 to $3\frac{1}{2}$	43	16	45	..

FORMALIN AND MASSEL POWDER AS PREVENTIVES OF SMUT IN OATS AND BARLEY.

Three varieties of grain were used in this experiment, viz.: Doncaster Prize oats and Odessa and Canadian Thorpe barleys. These were all sown on May 23, in plots 33 feet long, in rows 9 inches apart; four rows in each test, the heads of which were counted when the smut was fully advanced. The grain used for seed in each case was quite smutty.

OATS.

Name of Variety.	How Treated.	Preventive used.	Good Heads.	Smutty Heads.
Doncaster Prize	Soaked 1 hour	Formalin $4\frac{1}{2}$ ounces to 10 gallons water	2,612	21
"	" 15 minutes	" $4\frac{1}{4}$ " "	2,632	14
"	" 5 "	" $4\frac{1}{4}$ " "	2,581	15
"	Sprinkled	" 9 " "	2,602	19
"	Untreated		2,642	28
"	Soaked 10 minutes	Massel powder with lime	2,592	14

BARLEY.

Odessa	Soaked 1 hour	Formalin, $4\frac{1}{2}$ ounces to 10 gallons water	2,701	22
"	" 15 minutes	" $4\frac{1}{2}$ " "	2,642	18
"	" 5 "	" $4\frac{1}{2}$ " "	2,706	17
"	Sprinkled	" 9 " "	2,726	24
"	Untreated		2,742	31
"	Soaked 10 minutes	Massel powder with lime	2,638	27
Canadian Thorpe	" 1 hour	Formalin, $4\frac{1}{2}$ ounces to 10 gallons water	2,289	12
"	" 15 minutes	" $4\frac{1}{2}$ " "	2,309	16
"	" 5 "	" $4\frac{1}{2}$ " "	2,823	14
"	Sprinkled	" 9 " "	2,532	16
"	Untreated		2,621	26
"	Soaked 10 minutes	Massel powder with lime	2,298	14

EXPERIMENTS WITH FALL WHEAT.

The number of varieties of fall wheat under trial during the past season was twenty-two. Their names were as follows:—Poole, Gold Coin, Dawson's Golden Chaff, Bonnell, Standard, Winter King, Early Ripe, Red Velvet Chaff, Jones' Winter Fife, Pride of Illinois, American Bronze, Early Red Clawson, Russian Amber, Long Berry Red, Early Gennessee Giant, Buda Pesth, Reliable, Golden Cross, Imperial Amber, Tasmania Red, Egyptian and Velvet Chaff. These were all sown in plots of one-fortieth acre each, on September 13, 1899. The winter was unfavourable for this crop, and in the spring of 1900 all the plots were found to be so badly winter-killed that they were not worth leaving, and were ploughed under.

EXPERIMENTS WITH SPRING WHEAT.

Seventy-two varieties of spring wheat have been tested in the uniform trial plots during the past season. The soil was a heavy sandy loam of fairly good quality, slightly mixed with clay, which received a dressing of about 15 tons of barn-yard manure per acre in the spring of 1897. No fertilizer has been applied since. The previous crop was hay. The land was ploughed late in the autumn to the depth of about seven inches, and left in that state until the following spring, when it was harrowed twice with the disc-harrow and twice with the smoothing harrow before sowing. The size of the plots was one-fortieth acre each; they were all sown on April 28, using at the rate of one bushel and a half of seed per acre.

Spring Wheat—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Bush	Lbs.	Lbs.	
1	Huron	Aug. 13	107	43—47	Stiff	3 —3¾	Bearded . .	38	40	60¾	Slightly.
2	Wellman's Fife	" 14	108	45—49	"	3¼—4	Beardless.	35	20	58	"
3	Blenheim	" 13	107	40—43	"	2½—3½	Bearded . .	34	40	60½	"
4	Preston	" 11	105	42—45	"	3 —4	" . .	34	. .	60¾	"
5	Laurel	" 15	109	46—50	"	3 —4	Beardless.	33	40	59	"
6	Colorado	" 9	103	40—43	"	2½—3½	Bearded . .	33	20	61	"
7	Captor	" 9	103	38—41	"	3 —3¾	Beardless.	32	40	59½	"
8	Red Fern	" 13	107	40—43	"	3 —3¾	Bearded . .	32	40	61	"
9	White Russian	" 14	108	45—49	"	3¼—4	Beardless.	32	40	60	"
10	Weldon	" 10	104	37—40	"	3 —3¾	" .	32	40	61	"
11	Red Fife	" 16	110	38—42	"	3 —3½	" .	32	. .	59¾	"
12	Pringle's Champlain. .	" 13	107	38—42	"	3 —4	Bearded . .	32	. .	61¼	"
13	Admiral	" 12	106	40—45	"	2½—3½	Beardless.	31	20	58¾	"
14	Dion's	" 13	107	40—43	"	3 —4	Bearded . .	31	20	61½	"
15	Crown	" 12	106	40—44	"	2¾—3¾	" . .	31	20	60½	"
16	Roumanian	" 17	111	43—47	"	2 —3¼	" . .	31	20	62½	Considerably.
17	Stanley	" 10	104	40—43	"	3 —4	Beardless.	30	40	59	"
18	Harold	" 4	98	33—35	Weak . .	2 —2¾	Bearded . .	30	40	58½	"
19	Clyde	" 13	107	38—42	Stiff	3 —3½	Beardless.	30	40	60	Slightly.
20	Plumper	" 7	101	37—40	"	2½—3¼	Bearded . .	30	20	61	Considerably.
21	Monarch	" 15	109	42—46	"	3 —4	Beardless.	30	. .	58½	Slightly.
22	Beauty	" 13	107	42—46	"	3 —4	" .	30	. .	59	"
23	Crawford	" 9	103	40—43	Medium . .	3 —3¾	" .	30	. .	59	"
24	No. 19 (Australian) . .	" 16	110	43—47	Stiff	3 —3¾	" .	30	. .	59½	"
25	Percy	" 11	105	42—45	"	3 —3¾	" .	30	. .	60½	"
26	No. 9 (Australian) . . .	" 16	110	43—47	"	2½—3½	" .	30	. .	59½	Considerably.
27	Byron	" 11	105	35—40	Weak . . .	2½—3½	Bearded . .	30	. .	59	"
28	Chester	" 10	104	40—44	Stiff	3 —3½	Beardless . .	30	. .	. . . .	"

SPRING WHEAT—TEST OF VARIETIES—*Continued.*

Number.	Name of Variety.	Date of Ripening.		Number of days maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per Bushel.	Rusted.
					In.		In.		Bush	Lbs.	Lbs.	
29	Cartier	Aug.	10	104	35—38	Weak	2½—3½	Bearded	29	40	60¾	Considerably.
30	Goose	"	17	111	43—47	Stiff	2—3¼	"	29	20	62¾	"
31	Advance	"	12	106	42—45	"	3—4	"	29	20	60¾	Slightly.
32	Fraser	"	9	103	38—42	"	2½—3¼	"	29	20	59¾	Considerably.
33	No. 25 (Australian)	"	10	104	40—45	"	3—3½	Beardless	28	40	59	Slightly.
34	Blair	"	9	103	39—42	"	3—3½	Bearded	28	40	60½	Considerably.
35	No. 10 (Australian)	"	16	110	44—48	"	3—3½	Beardless	28	..	57	Slightly.
36	No. 23 (Australian)	"	14	108	42—46	"	3—3¾	"	28	..	....	"
37	White Fife	"	14	108	38—42	"	3—3½	"	28	..	59¾	"
38	Black Sea	"	8	102	40—44	"	3¼—4¼	Bearded	27	40	59	Considerably.
39	Cassel	"	15	109	36—39	Medium	3—3¾	Beardless	27	40	60	"
40	Alpha	"	13	107	40—44	Stiff	3—3½	"	27	20	60¾	Slightly.
41	No. 27 (Australian)	"	15	109	40—42	"	3—4	"	27	20	58½	"
42	White Connell	"	16	110	46—50	"	3—3½	"	27	..	59	"
43	Boyle	"	15	109	38—42	"	3—3¾	"	27	..	60	"
44	Rio Grande	"	15	109	44—48	Medium	3—3¾	Bearded	26	40	60½	"
45	Beaudry	"	12	106	38—42	Weak	2¼—3¼	"	26	40	59½	Badly.
46	Norval	"	7	101	34—37	Stiff	3—3¾	"	26	40	60	Considerably.
47	Mason	"	10	104	36—39	Weak	3—3¾	Beardless	26	40	60	Badly.
48	Progress	"	13	107	44—47	Stiff	3—3¾	"	26	20	60½	Slightly.
49	Ebert	"	7	101	40—43	"	3—3½	"	26	20	60½	Considerably.
50	Florence	"	13	107	35—39	Medium	2½—3½	Bearded	26	..	59	"
51	Herisson Bearded	"	13	107	35—40	"	2—2¾	"	26	..	62	"
52	Robins' Rust Proof	"	14	108	38—42	Weak	3—3½	Beardless	26	..	57½	Badly.
53	Vernon	"	13	107	38—42	Stiff	3—3¾	Bearded	26	..	59½	Slightly.
54	Powell	"	15	109	40—45	"	3—3½	Beardless	26	..	60	"
55	Hungarian	"	16	110	42—46	Medium	3—3¾	Bearded	25	40	61¾	Considerably.
56	Early Riga	"	6	100	34—37	Weak	2½—3½	Beardless	25	20	59	Badly.
57	White Chaff, Campbell's	"	10	104	40—45	Stiff	3—3½	"	25	20	56	Slightly.
58	Bishop	"	10	104	40—43	Weak	3—3½	"	25	20	59½	Badly.
59	Rideau	"	13	107	38—42	Stiff	2½—3½	"	25	20	57	Slightly.
60	Duff No. 13 (Australian)	"	16	110	43—46	"	3—3¾	"	25	..	57	"
61	Dawn	"	11	105	40—44	"	3—3¾	"	24	40	59	Considerably.
62	Ladoga	"	7	101	36—40	"	2¾—3½	Bearded	24	..	59	Slightly.
63	Japanese	"	8	102	34—37	Weak	2½—3	"	24	..	58	Considerably.
64	Angus	"	13	107	38—42	Medium	3—3¾	Beardless	22	40	59½	"
65	Red Swedish	"	10	104	40—45	Weak	3—3¾	Bearded	22	..	57½	Badly.
66	Countess	"	11	105	40—45	Stiff	2½—3½	Beardless	22	..	60	Considerably.
67	Essex	"	16	110	45—49	Weak	3—4	"	21	20	56	"
68	Dawson	"	16	110	45—49	"	3—3¾	"	20	40	56	"
69	Dufferin	"	11	105	42—46	Medium	2¾—3½	Bearded	19	20	58	Badly.
70	Benton	"	16	110	37—40	Weak	3—3½	Beardless	19	..	57	"
71	Hastings	"	14	108	36—40	"	2—3	"	18	..	59	"
72	Polonian	"	17	111	36—40	Stiff	4—5	....	13	20	53	"

In the foregoing list there are included forty-two of the new cross-bred sorts, which have been originated at the experimental farms. The names of these cross-bred sorts are :—Huron, Blenheim, Preston, Laurel, Captor, Weldon, Admiral, Crown, Stanley, Harold, Clyde, Plumper, Beauty, Crawford, Percy, Byron, Chester, Cartier, Advance, Fraser, Blair, Cassel, Alpha, Boyle, Norval, Mason, Progress, Ebert, Florence, Vernon, Powell, Early Riga, Bishop, Rideau, Dawn, Angus, Countess, Essex, Dawson, Dufferin, Benton, Hastings. The origin and parentage of all these, excepting three, will be found in the annual reports for 1896-7 and 1897-8. The three now added are the following :—

No. 43, Boyle, Beardless—Red Fife, female ; Ladoga, male.

No. 44, Florence, Bearded—Alpha, female ; Hard Red Calcutta, male.

No. 45, Powell, Beardless—Red Fife, female ; Hard Red Calcutta, male.

Of these results in cross-fertilizing, No. 43 was originated by the Director at the Central Experimental Farm in 1890, and 44 and 45 by Dr. A. P. Saunders in 1892, No. 44 at the Experimental Farm at Agassiz, B.C., and No. 45 at the Experimental Farm at Indian Head, N.W.T.

SPRING WHEAT GROWN FROM SCREENED SEED.

All the uniform trial plots of spring wheat were grown from seed obtained from carefully selected heads; the seed of the following eight varieties was not from selected heads. After the wheat plots were threshed, the grain for this purpose was passed through the fanning mill to separate the small kernels, and the clean plump seed remaining was saved. These eight varieties were all sown on plots of one-fortieth acre each, adjoining the uniform test plots; the soil and preparation was the same, and they were sown on the same day, April 28.

RESULTS of sowing Screened Seed compared with Selected Heads.

Number.	Name of Variety.	From Screened Seed. — Yield per Acre		Weight per Bushel.	From Selected Heads — Yield per Acre		Weight per Bushel.
		Bush.	Lbs.	Lbs.	Bush.	Lbs.	Lbs.
1	White Russian	32	40	59	32	40	60
2	Preston	32	..	61	34	..	$60\frac{3}{4}$
3	Wellman's Fife	32	..	$60\frac{1}{2}$	35	20	58
4	Colorado	29	..	$59\frac{1}{4}$	33	20	61
5	White Fife	28	..	60	28	..	$59\frac{3}{4}$
6	Stanley	27	20	$59\frac{3}{4}$	30	40	59
7	Percy	26	40	$59\frac{3}{4}$	30	..	$60\frac{1}{2}$
8	Red Fife	25	20	$60\frac{1}{2}$	32	..	$59\frac{3}{4}$

It will be seen that the seed from selected heads has given larger crops in every instance excepting two, White Russian and White Fife, where the yield was the same.

EXPERIMENTS WITH PEASE.

Fifty-six varieties of pease have been under trial in the uniform test plots during the past season. The ground chosen for this test was adjoining that of the uniform trial plots of oats, the soil was similar and the preparation and treatment of the land the same. The previous crop was mangels and sugar beets. The size of the plots was one-fortieth acre each, and all were sown on May 7, at the rate of 2 or $2\frac{1}{2}$ bushels per acre, according to the size of the pea.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Yield per Acre. Bush.	Yield per Acre. Lbs.	Weight per Bushel.
					Inches.	Inches.	Bush.	Lbs.	Lbs.
1	Golden Vine	Aug. 24	109	Strong	58–64	1½—2	40	..	63
2	Fergus	" 27	112	"	60–68	1½—2	38	40	62½
3	Paragon	" 22	107	Medium	48–54	2—2¾	36	..	63½
4	Early Britain	" 21	106	"	52–58	2½—2¾	35	20	59½
5	Duke	" 27	112	Strong	54–60	1½—2¼	35	20	62
6	Fenton	" 26	111	"	60–70	1½—2¼	33	20	60
7	Mummy	" 25	110	Medium	50–56	1½—2¼	33	20	62
8	Harrison's Glory	" 20	105	"	40–46	2—3	32	40	61
9	Prince	" 27	112	Strong	60–66	1¾—2¼	32	..	62
10	Chancellor	" 18	103	"	60–70	2—2½	31	40	62½
11	New Potter	" 27	112	"	60–70	2—2½	30	40	61½
12	Lanark	" 25	110	Medium	55–62	1¾—2¼	30	40	61½
13	Kent	" 25	110	Strong	62–70	1¾—2¼	30	20	62
14	Oddfellow	" 18	103	Medium	40–46	1½—2½	30	..	65
15	Arthur	" 18	103	Strong	40–45	2—3	30	..	63½
16	Dover	" 29	114	"	58–64	2—2½	29	20	63½
17	Prussian Blue	" 27	112	"	55–62	1¾—2½	28	40	62½
18	Wisconsin Blue	" 27	112	Medium	56–62	1½—2¼	28	40	62
19	White Wonder	" 18	103	"	30–36	2—2½	28	..	62½
20	Elephant Blue	" 25	110	Strong	50–56	1¾—2¼	28	..	62
21	Bright	" 29	114	"	58–64	1¾—2¼	27	20	62
22	Large White Marrowfat	" 28	113	"	60–70	2—2½	27	20	62½
23	Nelson	" 20	105	"	45–50	2½—2¾	27	..	62¾
24	English Gray	" 21	106	"	50–56	2—2¾	26	40	60
25	Canadian Beauty	" 23	108	"	55–60	2—3	26	..	63
26	Black-eyed Marrowfat	" 27	112	"	60–66	2—2½	26	..	61
27	Picton	" 25	110	"	55–60	2¼—2¾	26	..	62
28	Perth	" 22	107	Medium	40–46	2—3	25	40	61½
29	Creeper	" 23	108	"	50–58	1½—2¼	25	20	62½
30	Daniel O'Rourke	" 20	105	"	45–50	1½—2	25	20	62½
31	German White	" 20	105	Strong	50–56	2—2¾	25	20	61½
32	Pearl	" 26	111	"	50–56	2—2¾	25	20	62
33	Centennial	" 27	112	"	55–60	1¾—2¼	25	20	62½
34	Alma	" 23	108	"	50–56	2—2½	25	..	63
35	Gregory	" 20	105	"	55–62	2—2½	24	40	62
36	King	" 25	110	"	56–62	1½—2	24	..	62½
37	Pride	" 22	107	Weak	40–46	1½—2	24	..	62½
38	Agnes	" 22	107	Strong	58–64	2—3	24	..	63
39	Archer	" 27	112	"	65–75	1½—2¼	24	..	63
40	Crown	" 25	110	Medium	55–60	1¼—2	23	20	62½
41	Vincent	" 25	110	"	46–54	1¾—2¼	23	20	61
42	Victoria	" 20	105	Strong	50–60	2—2¾	23	20	62¼
43	Macoun	" 22	107	"	52–60	2—2¾	23	20	62
44	Trilby	" 24	109	"	58–64	1½—2	22	40	60½
45	Carleton	" 26	111	"	60–70	1¾—2¼	22	..	62
46	Prince Albert	" 26	111	"	58–64	1½—2	22	..	62
47	Mackay	" 24	109	"	50–56	2—2½	22	..	62
48	Herald	" 27	112	"	54–60	2—2½	22	..	63
49	Cooper	" 20	105	Medium	60–65	2—2½	20	40	62½
50	French Canner	" 18	103	"	45–50	2—2¾	20	40	61¼
51	Bruce	" 27	112	"	50–58	1½—2¼	20	..	62
52	Elder	" 21	106	Strong	48–50	1¾—2½	19	20	62
53	Elliot	" 25	110	"	55–65	2—2¾	19	20	62
54	Bedford	" 24	109	"	58–65	1¾—2½	18	..	62½
55	Chelsea	" 25	110	"	60–66	1¾—2¼	18	..	62½
56	Multiplier	" 27	112	"	62–68	1½—2	17	20	62

The foregoing list includes the following thirty cross-bred sorts, all of which have been originated at the experimental farms :—Fergus, Duke, Fenton, Prince, Lanark, Kent, Arthur, Dover, Bright, Nelson, Picton, Perth, Pearl, Alma, Gregory, King, Agnes, Archer, Vincent, Macoun, Trilby, Carleton, Mackay, Herald, Cooper, Bruce, Elder, Elliot, Bedford and Chelsea.

1. Corn Harvester at work.
2. Group of Steers for feeding.
3. Cutting ensilage and filling silo with blower.
4. Harvesting Banner Oats.

EXPERIMENTS WITH INDIAN CORN.

Thirty-four varieties of Indian corn were tested during the season of 1900, side by side, on fairly uniform land. The soil was a sandy loam of fairly good quality, which received a dressing of barn-yard manure, about twelve tons to the acre, during the winter of 1899-1900. This was placed on the frozen land fresh from the barn-yard, in small heaps of about one-third of a cart-load each, and spread and ploughed under in the spring. The previous crop was barley. The land was gang-ploughed shallow shortly after harvest to start weed seeds and shed grain, and ploughed again in the autumn seven or eight inches deep. In the spring of 1900, after the manure was ploughed under, it was harrowed twice with the smoothing harrow before sowing. The corn was sown with the seed drill, in rows three feet apart ; when the plants were from five to seven inches high they were thinned so as to leave them from six to eight inches apart in the rows.

The varieties were all sown on May 25, and were cut for ensilage on September 12. The yield per acre has been calculated from the weight of the crop cut from two rows, each 66 feet long.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per Acre grown in rows.	
			Inches.		September 12.	Tons.	Lbs.
1	Thoroughbred White Flint	Very strong.	100 to 112	Very leafy	Late milk	24	1,280
2	Red Cob Ensilage	"	108 to 120	Leafy	Early milk	23	1,740
3	Early Mastodon	Strong.	100 to 120	Very leafy	Late milk	23	1,300
4	Giant Prolific Ensilage	"	96 to 112	Leafy	Early milk	23	1,300
5	Superior Fodder	Very strong.	108 to 120	"	"	23	640
6	Salzer's All Gold	Strong.	96 to 108	"	Late milk	23	310
7	Champion White Pearl	"	110 to 120	Very leafy	"	23	200
8	Mammoth Cuban	"	90 to 102	Leafy	"	23	200
9	Longfellow	"	84 to 96	"	"	22	110
10	Angel of Midnight	"	86 to 96	"	Glazed	22	
11	Canada White Flint	"	90 to 100	"	Late milk	22	
12	White Cap Yellow Dent	"	86 to 100	"	Glazed	21	1,780
13	Cloud's Early Yellow	"	120 to 133	"	Late milk	21	900
14	Mammoth Eight-rowed Flint	"	84 to 102	"	Doughy	21	240
15	Pride of the North	"	96 to 118		Late milk	21	20
16	Selected Leaming,	"	112 to 124	Leafy	"	20	40
17	North Dakota White	"	90 to 102	"	"	20	40
18	Compton's Early	"	84 to 96	"	Glazed	19	500
19	Early Butler	"	90 to 102	Fairly leafy.	"	19	280
20	Pearce's Prolific	"	87 to 100	Leafy	"	18	1,400
21	King of the Earliest	"	84 to 96	"	"	18	850
22	Sanford,	"	84 to 96	"	"	17	1,910
23	Evergreen Sugar	"	84 to 96	Fairly leafy.	Late milk	17	1,200
24	Extra Early Huron	"	84 to 96	Leafy	Glazed	17	100
25	Early Giant	Medium	68 to 80	"	"	15	1,900
26	Early Yellow Long-eared	"	72 to 84	"	Doughy	13	1,280
27	Kendall's Giant	"	60 to 72	Fairly leafy.	Glazed	13	180
28	Country Gentleman,	"	80 to 90	"	Late milk	12	1,520
29	Mitchell's Extra Early	"	60 to 72	"	Ripe	12	310
30	Yellow Six Weeks Extra	"	60 to 72	"	"	11	110
31	Extra Early Szekley	"	68 to 80	"	"	10	1,780
32	Yellow Dakota Flint	"	60 to 72	"	"	10	1,780
33	Salzer's Earliest Ripe	"	60 to 72	"	"	9	1,800
34	Extra Early Corey	Weak	55 to 67	"	"	9	1,580

INDIAN CORN PLANTED AT DIFFERENT DISTANCES.

Three varieties of Indian corn were chosen for this test, the Longfellow, Selected Leaming and Champion White Pearl. They were sown in rows, at four different dis-

tances, viz., 21, 28, 35 and 42 inches apart. The soil was a sandy loam of fair quality; the previous crop was barley. The land was gang-ploughed shortly after harvest, very shallow, to start weed seeds and shed grain, and ploughed again later in the autumn, about seven inches deep. During the winter of 1899-1900, this land received a dressing of barn-yard manure, fresh from the barn-yard, which was distributed over the land in small piles of about one-third of a cart-load each. In the spring of 1900, the manure was spread and ploughed under about six inches deep, and the land harrowed twice before sowing. The corn was sown with the seed-drill on May 25, and cut for ensilage on September 12. Four rows were sown in each case, and the yield per acre has been estimated from the weight obtained from the two inside rows, 66 feet long.

Name of Variety.	Width of Row.	Character of Growth.	Height when Cut.	Condition when Cut.	Weight per Acre.	
	Inches.		Inches.		Tons.	Lbs.
Selected Leaming	21	Strong	74 to 84	Early milk	30	536
"	28	"	74 " 84	"	27	1,836
"	35	"	80 " 90	Late milk	21	1,780
"	42	Very strong	80 " 90	"	19	496
Longfellow	21	Strong	80 " 92	Early milk	18	1,600
"	28	"	80 " 92	"	18	1,929
"	35	"	84 " 96	Late milk	22	1,100
"	42	Very strong	80 " 94	"	18	1.784
Champion White Pearl	21	Strong	108 " 120	Early milk	19	1,480
" "	28	"	108 " 120	"	20	1,018
" "	35	"	112 " 124	Late milk	23	200
" "	42	Very strong	112 " 124	"	21	48

EXPERIMENTS WITH TURNIPS.

Twenty-seven varieties of turnips were on trial during the past season, all sown side by side on similar land. The soil was a heavy sandy loam of good quality, more or less mixed with clay. The previous crop was experimental plots of wheat and barley. During the winter of 1899 and 1900 this land received a dressing of about 12 tons of fresh barn-yard manure per acre, which was placed on the frozen ground in small piles of about a third of a cart-load each to prevent fermentation. This was spread in the spring, ploughed under about six inches deep, harrowed with the smoothing harrow, and cultivated before sowing. The land was then made up in drills two feet apart, and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. The seed was sown at the rate of three pounds per acre. Two sowings were made of each sort, the first on May 16, the second on May 30. They were also pulled on two different dates. The first pulling was on October 16 and the second on November 6. The yield per acre has been calculated from the weight of roots gathered from one row 66 feet in length.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing, 1st Pulling, October 16.		Yield per Acre from 2nd Sowing, 1st Pulling, October 16.		Yield per Acre from 1st Sowing, 2nd Pulling, November 6.		Yield per Acre from 2nd Sowing, 2nd Pulling, November 6.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Carter's Elephant	42	1,800	25	1,150	45	1,080	29	410
2	Skirvings	37	1,240	31	865	39	210	32	680
3	Champion Purple Top	36	1,590	26	925	35	1,445	26	635
4	West Norfolk Red Top	36	930	29	1,400	37	1,570	30	1,545
5	Sutton's Champion	36	105	34	1,300	36	1,920	34	805
6	Monarch	35	1,940	18	795	39	1,530	23	1,520
7	Magnum Bonum	35	1,280	30	1,710	33	1,320	36	270
8	Drummond Purple Top	35	620	24	1,830	41	1,160	29	740
9	Shamrock Purple Top	33	825	31	37	34	310	29	1,730
10	Turnip seed from Whitman Butler, Kelly's Cove, N.S.	33	660	34	310				
11	Perfection Swede	33	825	28	925	37	580	28	1,750
12	Kangaroo	33	330	29	575	33	1,980	32	845
13	Elephant's Master	32	1,835	30	1,050	30	720	29	905
14	Purple Top Swede	32	1,340	28	760	33	1,320	30	390
15	Hall's Westbury	32	1,010	23	530	38	65	32	350
16	Champion Purple Top	32	680	30	1,050	33	1,485	32	185
17	East Lothian	32	350	21	240	35	620	29	80
18	Hartley's Bronze Top	31	1,360	24	1,170	34	970	32	20
19	Mammoth Clyde	31	1,195	26	1,790	36	1,920	24	510
20	New Arctic	31	1,030	24	180	35	620	25	1,315
21	Marquis of Lorne	31	1,030	26	965	32	1,340	27	285
22	Jumbo	31	370	27	1,935	34	970	28	595
23	Webb's Imperial	30	390	26	1,130	35	1,610	27	1,440
24	Prize Winner	29	80	22	1,375	31	1,855	24	840
25	Prize Purple Top	28	1,750	23	860	28	430	26	800
26	Halewood's Bronze Top	28	100	14	1,370	33	1,650	23	530
27	Bangholm Selected	27	1,440	24	510	39	1,860	29	410
28	Giant King	24	180	21	900	31	370	17	1,310

					Tons.	Lbs.
The average of the 1st sowing, 1st pulling was					32	1,541
"	2nd	"		"	26	430
"	1st	"	2nd	"	35	1,219
"	2nd	"		"	28	1,218

INCREASE IN CROP OF TURNIPS FROM EARLY SOWING ALSO FROM LATE PULLING.

The results here given emphasize the advantages of early sowing. The average yield of turnips from all the varieties from the first sowing and first pulling has exceeded those of the second sowing by 6 tons 1,111 pounds, and in the case of the second pulling made twenty-one days later the larger weight from the earlier sowing is well maintained, the difference being 7 tons 1 pound per acre in favour of early sowing.

The figures given also show that the 21 days of additional time given to the roots to grow between October 16 and November 6 resulted in an average increase in weight in the early sown plots of 2 tons 1,678 pounds per acre, while those later sown increased in weight during the same period 2 tons 788 pounds per acre.

Two acres were sown to fill up the block on the experimental grounds. The soil was clay loam of good quality. The previous crop was experimental plots, wheat, oats, barley. This land received the same fertilizing and treatment as that on which the test of varieties was made. It was cultivated several times in the spring on very sunny days to kill some scutch grass before sowing, it was then made into drills 2 feet apart, and subsequently rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. The variety chosen was Skirvings, the seed was sown at the rate of 3 pounds per acre on June 16 came up June 21, and the roots were pulled November 6. Yield per acre, 25 tons 1,275 pounds, or 854 bushels 35 pounds.

EXPERIMENTS WITH MANGELS.

The number of varieties of mangels under test in 1900 was twenty-two. These were all sown side by side adjoining the turnips ; the land was similar in character and its treatment and preparation was the same. The drills were made up two feet apart and rolled with a heavy land roller to make a firm bed before the seed was sown. Two sowings were made of each sort, the first on May 16, the second on May 30. They were also pulled on two different dates, the first pulling was on October 16 and the second on November 6. The yield per acre has been calculated from the weight of roots gathered from one row, 66 feet in length.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing, 1st Pulling October 16.		Yield per acre from 2nd Sowing, 1st Pulling October 16.		Yield per acre from 1st Sowing, 2nd Pulling November 6.		Yield per acre from 2nd Sowing, 2nd Pulling November 6.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Canadian Giant	51	630	34	310	51	1,620	34	1,465
2	Giant Yellow Intermediate	49	340	24	1,500	49	835	27	1,770
3	Ward's Large Oval Shaped	47	1,040	33	1,650	46	1,720	35	620
4	Mammoth Long Red	46	400	39	540	40	685	40	520
5	Giant Yellow Half Long	45	1,080	25	1,150	40	1,923	31	1,360
6	Yellow Intermediate	44	440	38	560	45	750	39	870
7	Gate Post	42	480	34	1,300	41	253	33	1,320
8	Half Long Sugar Rosy	42	295	28	430	43	1,120	38	890
9	Champion Yellow Globe	42	150	35	290	43	130	35	1,280
10	Yellow Intermediate	42	150	40	1,510	42	1,470	41	1,160
11	Half Long Sugar White	41	1,820	31	700	33	1,320	39	1,860
12	Prize Mammoth Long Red	41	1,490	33	990	42	150	33	1,650
13	Lion Yellow Intermediate	41	500	40	1,180	40	685	39	1,200
14	Gate Post Yellow	41	500	29	1,400	39	870	30	1,215
15	Giant Yellow Globe	41	170	27	450	41	830	30	1,050
16	Yellow Globe	41	170	37	580	40	1,345	40	1,840
17	Mammoth Oval Shaped	39	210	41	500	41	5	38	1,880
18	Norbitan Giant	37	910	31	1,360	38	1,220	32	1,670
19	Selected Mammoth Long Red	37	250	30	1,050	39	1,860	31	370
20	Golden Fleshed Tankard	36	1,590	31	1,855	37	580	32	680
21	Yellow Fleshed Tankard	31	865	30	60	33	330	31	1,690
22	Warden Orange Globe	31	370	30	60	35	455	31	535

	Tons.	Lbs.
Average of 1st sowing, 1st pulling	41	1,084
" 2nd " 1st "	41	553
" 1st " 2nd "	33	338
" 2nd " 2nd "	35	223

SUMMARY.

In 1898 there was a considerable increase in the crop of mangels from the early sown plots; this year only a small advantage was gained by early sowing. The average of the crops from the first sowing was only 531 pounds per acre above that from the second sowing. At the same time there was a falling off in both instances in the second pulling, probably the result of unfavorable conditions of weather.

EXPERIMENTS WITH CARROTS.

Nineteen varieties of carrots were under test during 1900, all sown side by side adjoining the turnips and mangels. The land was similar in character and its treatment and preparation were the same. The land was made up in drills two feet apart, and rolled with a heavy land roller to make a firm bed before the seed was sown. Two sowings were made of each sort, the first on May 16, the second on May 30. They were also pulled on two different dates; the first pulling was on October 16, the second on November 6. The yield per acre has been calculated from the weight of roots gathered from one row 66 feet long.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st Sowing, 1st Pulling October 16.		Yield per acre from 2nd Sowing, 1st Pulling October 16.		Yield per acre from 1st Sowing, 2nd Pulling November 6.		Yield per acre from 2nd Sowing, 2nd Pulling November 6.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	White Vosges Large Short	38	1,880	27	1,770	39	870	27	1,110
2	New White Intermediate	37	250	31	1,810	35	950	33	330
3	Improved Short White	35	1,280	27	120	41	170	28	1,915
4	Half Long White	33	1,155	27	1,275	37	580	33	1,980
5	Iverson's Champion	32	1,340	26	1,130	37	910	30	1,380
6	Green Top White Orthe	32	915	26	470	33	1,650	26	965
7	Giant White Vosges	31	700	25	1,150	31	1,030	27	450
8	Guerande or Ox-Heart	27	615	23	1,190	30	1,380	29	1,730
9	Yellow Intermediate	26	1,460	24	1,170	27	1,770	27	120
10	Ontario Champion	26	800	24	15	32	515	29	1,730
11	Mammoth White Intermediate	26	140	22	550	35	620	23	1,850
12	Carter's Orange Giant	25	1,810	21	1,560	27	120	24	1,170
13	Half Long Chantenay	25	985	24	1,170	27	615	23	695
14	Early Gem	25	820	22	550	35	290	25	1,480
15	White Belgian	22	380	21	570	22	1,540	22	220
16	Scarlet Intermediate	19	1,270	15	1,185	21	1,230	19	1,930
17	Scarlet Nantes	17	1,805	15	690	18	300	16	1,990
18	Long Orange or Surrey	17	1,805	14	50	21	1,560	17	650
19	Long Scarlet Altringham	17	650	12	1,080	20	590	15	360

	Tons.	Lbs.
Average of 1st sowing, 1st pulling	27	766
" 2nd " 1st "	22	1,763
" 1st " 2nd "	30	668
" 2nd " 2nd "	25	950

INCREASE IN CROP OF CARROTS FROM EARLY SOWING, ALSO FROM LATE PULLING.

With carrots early sowing has been attended with much advantage. The average yield from all the varieties from the first sowing and first pulling was four tons 1,003 pounds more than was harvested from the second sowing.

During the 21 days between the dates of the first and second pullings, the early sown plots gained on an average 2 tons 1,902 pounds per acre, while the roots from the second sowing during the same time made a gain of 2 tons 1,187 pounds per acre.

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were tested in 1900. They were sown side by side on land adjoining that used for the trial plots of turnips, mangels and carrots ; the soil was similar and the treatment and preparation of the land and the method of sowing were the same. Two sowings were made, the first on May 16, the second on May 30. They were also pulled at two different dates ; the first pulling was on October 16, the second on November 6. The yield per acre has been calculated from the weight of roots gathered from one row 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing, 1st Pulling October 16.		Yield per Acre from 2nd Sowing, 1st Pulling October 16.		Yield per Acre from 1st Sowing, 2nd Pulling November 6.		Yield per Acre from 2nd Sowing, 2nd Pulling November 6.	
		Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
1	Danish Improved	42	810	28	430	35	1,280	35	1,940
2	Wanzleben	40	355	31	1,030	40	520	35	455
3	Improved Imperial	38	1,335	25	490	32	1,340	33	330
4	Red Top Sugar	37	580	26	1,130	36	1,260	31	700
5	Danish Red Top	34	805	31	1,030	35	620	39	1,200
6	Vilmorin's Improved	27	615	22	220	27	1,110	25	1,150

	Tons.	Lbs.
Average of 1st sowing, 1st pulling	36	1,417
" 2nd " 1st "	27	1,055
" 1st " 2nd "	34	1,355
" 2nd " 2nd "	33	963

The increase in crop from the early sowing of sugar beets was very marked this year, the gain amounting to 9 tons 362 pounds per acre. There was a slight decrease in the crop in the second pulling of the early sown plots, but on those later sown the increase was 5 tons 1,908 pounds per acre.

FIELD PLOTS OF POTATOES.

The following field plots of potatoes were included in the land devoted to experimental purposes. The land on which these potatoes were planted was similar throughout, and the preparation and treatment were the same for all. The soil was a light sandy loam. The previous crop was pease. During the winter of 1899 and 1900 it received a dressing of about 12 tons of fresh barn-yard manure per acre, which was placed during the winter on the frozen ground in small piles of about a third of a cart-load each, to prevent fermentation. This was spread in the spring, ploughed under about six inches deep, and harrowed with the smoothing-harrow, then made into drills 2½ feet apart and six inches deep for planting.

No.	Name of Variety.	When Planted.		Came up.		When Dug.		Yield per Acre.	
								Bush.	Lbs.
1	Carmans No. 1..	May	23..	June	12..	Sept.	27..	387	44
2	Early Sunrise..........................	"	25..	"	12..	"	28..	257	30
3	Burnaby Seedling..........	"	25..	"	12..	"	29..	228	43
4	Early Harvest......	"	25..	"	12..	October	1 .	327	1
5	*Empire State..........................	"	25..	"	12..	"	1..	226	15
6	†American Wonder.......	"	25..	"	12..	"	2..	165	47
7	*Everett...	"	25..	"	12..	"	2..	221	10
8	Wonder of the World..................	June	1..	"	17..	"	3..	333	16
9	Early Rose.	"	1..	"	17..	"	3..	291	47
10	Seedling 230.....	"	1..	"	17..	"	3..	428	41
11	Prize Taker............................	May	28..	"	15..	"	3..	290	24
12	Uncle Sam..	"	28..	"	15..	"	3..	313	33
13	Early White Prize.................. ..	"	28..	"	15..	"	3..	351	34

* Part in low land. † Wet low land lessened the yield.

Number	Name of Variety.	When Planted.	Came Up.	When Dug.	Yield Per Acre.
1	Sir Walter Raleigh................	May 28. ..	June 15....	Oct. 3......	325·33
2	Vigorosa	" 28.....	" 15....	" 3.....	318·25
3	New Queen.	" 28.....	" 15.. .	" 3......	316·53
4	Honeoye Rose	" 28....	" 15....	" 3	272·34
5	Canadian Beauty....	" 28.....	" 15 ...	" 3 ...	453·26
6	Early Andes..........	" 28.....	" 15....	" 3......	384·39
7	Prolific Rose.....	" 28.....	" 15....	" 3......	351·32
8	Bovee.........	" 28.....	" 15....	" 3.. ...	360·42
9	Rochester Rose........	" 28.....	" 15....	" 3	255·53

EXPERIMENTS WITH SUNFLOWERS.

A plot covering a quarter of an acre was sown with this crop. The soil was a sandy loam of good quality. The previous crop was oats. After the oat crop was cut the land was gang-ploughed shallow, and later in the autumn it was ploughed to the depth of 7 or 8 inches. During the winter of 1899 and 1900 the land received a dressing of fresh barn-yard manure, about 12 tons per acre. This was placed on the frozen ground in small piles of about one-third cart-load each to prevent fermentation and loss, and spread and ploughed under in the spring of 1900. The land was then harrowed twice with the disc-harrow and three times with the smoothing-harrow, when the seed was sown with the grain drill in rows 3 feet apart, about 3 or 4 pounds of seed being used per acre. Subsequently the plants were thinned out when they were 4 or 5 inches high, so as to leave them from 12 to 15 inches apart in the rows.

The variety tried was Mammoth Russian, black seed. It was sown on May 25, and the heads were cut on September 15 and put in the silo. The plants made a strong growth, and the heads were ripe when cut.

Yield of heads per acre was 6 tons 1,920 pounds.

This crop should have been sown earlier. In our experience, sunflowers cannot be sown too early; the earlier the seed is got in the larger the crop, provided the season is favourable.

EXPERIMENTS WITH SOJA BEANS.

(Soja hispida.)

Three plots of one-fortieth acre each were sown in rows, at different distances, viz.: 21, 28 and 35 inches apart, to gain information as to the best distance for sowing to secure the heaviest crops. The soil was a sandy loam of good quality. The previous crop was corn. After the corn was cut the land was ridged up with a double mould-board plough and left in ridges until the spring of 1900. The ridges were two feet and a half apart. This land received a dressing of barn-yard manure, about 12 tons per acre, during the winter of 1898 and 1899. In the spring of 1900 the ground was cultivated twice with a two-horse cultivator and twice with smoothing harrow. The beans were sown with a seed drill on May 22, and cut on September 13.

Plot 1.—Sown in rows 21 inches apart; growth strong and even, leafy; average height 40 to 44 inches. The pods were well formed, but the beans were soft when the crop was cut. Yield of green fodder, 10 tons 80 pounds per acre.

Plot 2.—Sown in rows 28 inches apart; growth strong and even, very leafy. Average height 40 to 44 inches. The pods were well formed, the beans were full grown and beginning to harden at time of cutting. Yield of green fodder, 12 tons 400 pounds per acre.

Plot 3.—Sown in rows 35 inches apart; growth strong and even, leafy, stems hard and woody. Average height 40 to 44 inches. The plants were better podded than those in plots 1 or 2, and the beans were harder when cut, but the plant was less valuable for fodder. Yield of green fodder, 10 tons 520 pounds per acre.

EXPERIMENTS WITH HORSE BEANS.

(Faba vulgaris var. equina.)

Three plots of one-fortieth acre each were sown in rows 21, 28 and 35 inches apart, to gain information as to the best distance for sowing to secure the heaviest crops. The land was adjoining that used for Soja beans, was similar in quality and received the same treatment. The previous crop was corn. The beans were sown with the seed drill; all the plots were sown on May 22 and cut September 13. The plants were free from blight.

Plot 1.—Sown in rows 21 inches apart. Growth strong, well podded. Height 42 to 46 inches, considerably lodged. The beans were nearly ripe when cut. Total yield, 9 tons 200 pounds per acre.

Plot 2.—Sown in rows 28 inches apart. Growth strong and well podded. Height 45 to 49 inches. Plot all standing, stalks considerably stiffer than in plot No. 1. The beans were nearly ripe when cut. Total yield, 8 tons 1,680 pounds per acre.

Plot 3.—Sown in rows 35 inches apart. Growth strong, well podded. Height 45 to 49 inches. Plot all standing, stalks stiff. The beans were nearly ripe when cut. Total yield, 9 tons 1,760 pounds per acre.

EXPERIMENTS WITH MILLETS.

Seven varieties were sown on plots of one-fortieth acre each. All were sown in drills 7 inches apart. The soil was a sandy loam. The previous crop was corn. The land receiving a dressing of barn-yard manure during the winter of 1898 and 1899. After the corn was cut the land was drilled up in ridges 2½ feet apart with a double mould-board plough, and left in that state until the spring of 1900, when it was cultivated twice with a two-horse cultivator and twice with a smoothing harrow before sowing. The seed was sown with a Planet Junior seed drill, and all the varieties were sown on May 23. The plots suffered from continued wet weather, and made very slow growth. These were all cut when the seed was in the doughy stage.

Number.	Name of Variety.	Date Cut.	Length of Straw.	Character of Growth	Weight Per Acre Green.		Weight Per Acre Dry.	
			Inches.		Tons	Lbs.	Tons	Lbs.
1	Italian or Indian	Sept. 12	56—60	Strong	7	1500	4	160
2	Golden	" 22	50—55	"	7	400	4	1680
3	Japanese	" 10	40—45	Medium	6	1800	4	1978
4	Algerian	" 13	50—55	Strong	5	800	3	1206
5	White Round French	Aug. 22	40—45	Medium	5	226	3	680
6	Moha Hungarian	" 22	40—45	"	5	101	3	1200
7	Pearl, late or Cat-tail	Sept. 22	30—40	"	4	1600	3	201

ORNAMENTAL TREES AND SHRUBS.

The ornamental trees and shrubs on the lawns and along the margins of the roads leading to the buildings are making rapid growth, and among them are many individual specimens of great beauty. The number of species and varieties now growing in the various clumps and groups on this part of the Experimental Farm is about 500, and includes many rare species as well as most of the more common and well-known sorts. The succession of bloom in the flowering shrubs and the many changing tints of colour shown on the foliage of both evergreen and deciduous species as the season progresses, combine to make the shrubbery borders a source of pleasure to all who see them. In plate 1 a view is presented of the planting of a part of the main road leading to the office building.

DISTRIBUTION OF SEED GRAIN TO FARMERS FOR TRIAL.

Another distribution of seed grain was made in the spring of 1900, consisting of samples of the most promising sorts of oats, spring wheat, barley, pease, Indian corn and potatoes. The object in view in these annual distributions is to place within reach of farmers, for the improvement of seed, pure samples of the best and most productive varieties in cultivation. By the careful growing of one of these samples of grain the product will soon be sufficient to sow a large area, and thus in a short time the farmer can provide himself with some of the best sorts without cost, beyond that of his own labour. The appreciation in which this part of the work is held is evidenced by the very large demand each year for such samples.

The samples sent out from the Central Experimental Farm during the early months of 1900 were distributed as follows:—

Number.	Kind of Grain.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	North-west Territories.	British Columbia.
1	Oats	605	1,128	951	1,519	2,478	1,094	608	122
2	Barley	131	501	215	509	651	295	152	41
3	Wheat	295	736	958	1,581	932	604	300	53
4	Pease	41	536	476	446	840	546	322	66
5	Indian Corn	28	284	217	345	905	122	44	26
6	Potatoes	112	730	849	779	2,392	882	425	179
	Total	1,212	3,915	3,666	5,179	8,198	3,543	1,851	487

Total number of samples distributed 28,082
Number of applicants supplied 28,051

The following list shows the number of 3-pound packages of the different varieties which have been sent out :—

Name of Variety.	Number of Packages.
Oats.	
Improved Ligowo	2,263
Banner	1,105
Siberian	914
Golden Beauty	773
Wide Awake	590
Abundance	589
Bavarian	588
American Beauty	508
Holstein Prolific	369
Prolific Black Tartarian	297
Wallis	272
Golden Giant	139
Bonanza	100
White Schonen	67
Joanette	23
Total	8,597
Barley.	
Six-rowed.	
Mensury	817
Royal	398
Odessa	371
Oderbruch	256
Trooper	52
Two-rowed.	
Canadian Thorpe	305
French Chevalier	216
Sidney	49
	2,464
Spring Wheat.	
Preston	1,257
Red Fife	927
Percy	629
White Connell	602
Wellman's Fife	587
White Fife	478
Stanley	351
White Russian	269
Hungarian	228
Monarch	81

Name of Variety.	Number of Packages.
Spring Wheat—*Concluded.*	
Dufferin	56
Total	5,465
Pease.	
Canadian Beauty	1,353
Large White Marrowfat	950
Prussian Blue	693
Black Eyed Marrowfat	195
Total	3,191
Indian Corn.	
Selected Leaming	941
Longfellow	502
Angel of Midnight	157
White Cap Yellow Dent	135
Early Butler	103
Compton's Early	47
Champion White Pearl	39
Sanford	30
Pearce's Prolific	8
Total	1,962
Potatoes.	
American Wonder	787
Daisy	749
Carman's No. 1	643
Dakota Red	602
Wonder of the World	485
Clarke's No. 1	415
Early Sunrise	389
Rochester Rose	367
Everett	309
Early Harvest	280
Lee's Favourite	279
Henderson's Late Puritan	263
I.X.L	249
Vanier	170
Empire State	154
Early Rose	138
Burnaby Seedling	124
Total	6,403

Total number of packages distributed—

Wheat	5,465
Oats	8,597
Barley	2,464
Pease	3,191
Corn	1,962
Potatoes	6,403
Total number of samples sent out during the season	28,082

DISTRIBUTION OF SAMPLES OF GRAIN SUFFICIENT FOR ONE-TENTH OF AN ACRE.

The distribution of grain in larger samples sufficient for one-tenth acre plots begun in 1899 was continued in 1900. These samples were sent to a special but limited list of farmers selected from among those who have shown a special interest in this important work. In preparing the list for this purpose, the names have been chosen from every part of the Dominion, and every agricultural constituency has been represented.

These special samples, to the number of 3,127, have been distributed by provinces as follows:—

Name of Grain.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	N.W.T.	B.C.
Oats	51	163	173	451	491	73	57	26
Spring wheat	50	84	155	361	249	49	38	16
Barley	31	75	50	218	199	39	25	3
Total	132	322	378	1,030	939	161	120	45

The following list shows the number of these larger packages of the different varieties which have been sent out:—

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
OATS.		WHEAT—*Continued.*	
Abundance	401	Percy	131
Improved Ligowo	390	Advance	107
American Beauty	260		
Banner	227	Total	977
Golden Giant	148		
Bavarian	78	BARLEY.	
Total	1,504	Royal	303
		Trooper	146
WHEAT.		Beaver	128
		Sidney	69
Preston	378		
Wellman's Fife	228	Total.	646
Stanley	133		

Oats	1,504
Wheat	977
Barley	646
Total	3,127

TESTS OF THE VITALITY OF GRAIN AND OTHER SEEDS DURING 1900.

During the early months of the season of 1900, the number of samples of seed grain and other seeds tested for their vitality was 2,098. These were sent in chiefly by farmers and came from many different parts of Canada. This work is carried on from year to year to give to farmers the opportunity of having any doubtful samples tested. By this means any injury to the vitality of grain from unfavourable weather during harvest may be promptly detected and the extent of the injury ascertained. Samples may be sent to the Central Experimental Farm, free, through the mail, and the quantity necessary for the test is about one ounce. The samples are tested and reported on free of charge, and their percentage of vitality can usually be determined within two weeks after they are received.

Results of Tests of Seeds for Vitality, 1899–1900.

Kind of Seed.	Number of Tests.	Highest Per centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
Wheat	534	100·0	21·0	83·2	4·7	87·8
Barley	465	100·0	22·0	75·8	8·3	84·2
Oats	595	100·0	11·0	89·8	4·8	94·7
Rye	1	88·0	88·0	78·0	10·0	88·0
Pease	94	100·0	72·0	...	...	94·9
Corn	10	100·0	88·0	...	...	94·8
Grass	13	88·0	16·0	...	...	55·8
Clover	5	82·0	0·0	...	...	48·2
Turnips	20	89·0	20·0	...	...	67·2
Mangels	18	90·0	22·0	...	...	63·2
Carrots	14	62·0	7·0	...	...	40·0
Cabbage	33	96·0	6·0	...	...	58·4
Tomatoes	21	100·0	7·0	...	...	59·8
Radish	22	100·0	38·0	...	...	68·2
Lettuce	23	96·0	1.0	...	...	41·8
Spinach	8	39·0	9·0	...	...	27·0
Onions	24	84·0	1·0	...	...	46·6
Beets	17	96·0	32·0	...	...	71·6
Celery	19	87 0	3·0	...	...	50·1
Cauliflower	8	95·0	40·0	...	...	73·2
Brocoli	3	44·0	7·0	...	...	31·3
Savoy Cabbage	2	86·0	73·0	...	...	79·5
Pumpkins	4	29·0	0·0	...	...	12·5
Squash	16	80·0	0·0	...	...	18·7
Water Melon	13	75·0	0·0	...	...	14·2
Musk Melon	16	48·0	0·0	...	...	12·8
Cucumber	10	92·0	0·0	...	...	30·4
Citron	3	80·0	5·0	...	...	31·6
Sweet Peas	16	100·0	0·0	...	...	54·6
Flax	4	75·0	2·0	...	...	46·7
Mustard	4	88·0	76·0	...	...	80·2
Cress	3	78·0	2·0	...	...	50·3
Tobacco	9	85·0	26·0	...	...	58·1
Leeks	3	64·0	55·0	...	...	58·0
Salsify	3	85·0	4·0	...	...	40·6
Parsnips	3	45·0	38·0	...	...	41·0
Nasturtium	2	50·0	20·0	...	...	35·0
Chicory	3	75·0	67·0	...	...	71·0
Sweet Marjoram	4	52·0	19·0	...	...	28·5
Summer Savory	2	52·0	18·0	...	...	35 0
Sage	2	63·0	30·0	...	...	46·5
Sweet Basil	2	38 0	21·0	...	...	29 5
Carraway Seed	2	75·0	1·0	...	...	38·0
Horehound	2	2·0	0·0	...	...	1·0
Mignonette	2	18·0	13·0	...	...	15·5
Egg Plant	2	21·0	11·0	...	...	16·0
Rape	2	99·0	56·0	...	...	77·5
Tares	1	100·0	100·0	...	...	100·0
Canary Seed	1	57·0	57·0	...	...	57·0
Sunflower	1	100·0	100 0	...	...	100·0
Parsley	4	25·0	3·0	...	...	12·7
Brussel Sprouts	1	76·0	76·0	...	...	76·0
Celeriac	1	47·0	47 0	...	...	47·0
Asparagus	1	30·0	30·0	...	...	30·0
Rhubarb	1	60·0	60·0	...	...	60·0
Endive	1	66·0	66·0	...	...	66·0
Chervil	1	4·0	4.0	...	...	4·0
Anise	1	5 0	5·0	...	...	5·0
Rue	1	8 0	8·0	...	...	8·0
Thyme	1	4·0	4.0	...	...	4·0
Ampelopsis	1	5·0	5·0	...	...	5·0
Total number of samples tested, highest and lowest percentage.	2,098	100·0	0·0	...	...	...

(Signed) W. T. ELLIS.

TABLE showing Results of Grain Tests for each Province.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth.	Average Vitality.
ONTARIO.						
Wheat	130	100·0	45·0	69·4	6·8	76·3
Barley	101	100·0	60·0	83·4	9·1	92·5
Oats	139	100·0	59·0	90·6	6·8	97·4
QUEBEC.						
Wheat	52	100·0	86·0	92·3	2·8	95·1
Barley	88	100·0	64·0	85·7	8 2	94·0
Oats	51	100·0	60·0	91·0	3·2	94·2
MANITOBA.						
Wheat	117	100·0	21·0	86·8	3·7	90·6
Barley	70	100 0	22·0	87·5	6·3	93·8
Oats	135	100·0	80·0	91·8	4·0	95·9
NORTH WEST TERRITORIES.						
Wheat	109	100·0	43·0	87·1	3·9	91·1
Barley	71	100·0	75·0	90·4	4·7	95·2
Oats	112	100·0	11·0	86·3	5·5	91·8
NOVA SCOTIA.						
Wheat	25	99·0	65·0	85·1	3·8	89·0
Barley	71	100·0	69·0	72·2	16·7	89·0
Oats	25	100·0	68·0	88·2	3·5	91·8
NEW BRUNSWICK.						
Wheat	26	100·0	77·0	90·2	3·4	93·6
Barley	40	100·0	65·0	80·3	10·7	91·1
Oats	25	100·0	88·0	92·2	3·5	95·8
PRINCE EDWARD ISLAND.						
Wheat	67	100·0	63·0	86·0	4·9	91·0
Barley	22	100·0	64·0	80·7	10·5	91·2
Oats	95	100·0	66 0	88·7	4·3	93·1
BRITISH COLUMBIA.						
Wheat	8	99·0	68·0	88·2	1·6	89·8
Barley	2	97·0	97·0	95·5	1·5	97·0
Oats	13	99·0	89.0	92·0	2·4	94·5

EFFECT OF THE PLOUGHING UNDER OF GREEN CLOVER AS A FERTILIZER FOR OATS.

In the spring of 1899, six plots of one-fortieth acre each were sown with grain. Two of these plots were sown with Preston wheat, two with Mensury barley, and two with Banner oats. One of these plots in each case had clover sown with the grain at the rate of 12 pounds per acre; the other had no clover. The soil was a sandy loam of fairly good quality, and up to this time the land had ben used as a nursery. After the grain crop had been taken off, the clover was allowed to grow until late in the autumn, when it was ploughed under to the depth of 6 or 7 inches. In the spring of 1900 the land was harrowed twice with a disc-harrow and twice with a smoothing harrow, and sown with one kind of oats, viz., New Zealand, at the rate of 2 bushels of seed per acre. The oats were sown on May 4.

No. of Plot.	Variety.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield of Oats per Acre in 1900.		Rusted.
	New Zealand Oats Sown After.	Inches.		Inches.		Bush.	Lbs.	
1	Preston wheat, 1899, with clover...	48–52	Stiff	9–10½	Sided.....	53	18	Slightly.
2	Preston wheat, 1899, no clover.....	44–48	"	9–10	"	51	26	"
3	Mensury barley, 1899, with clover..	48–54	"	9–11	"	58	28	"
4	Mensury barley, 1899, no clover...	45–50	"	9–10	"	56	16	"
5	Banner Oats, 1899, with clover ..	48–54	"	9–11	"	58	28	"
6	Banner oats, 1899, no clover.	46–50	"	9–10½	"	56	16	"

The advantage arising from the sowings of clover with spring grain recorded above are quite evident but would no doubt have made much more difference but for the fact that the clover was sown late in the spring of 1899 and hence the growth for ploughing under was comparatively short and unsatisfactory.

EFFECT OF THE PLOUGHING UNDER OF GREEN CLOVER AS A FERTILIZER FOR INDIAN CORN.

In the spring of 1899, six plots, one-fortieth acre each, were sown with grain. Two of these plots were sown with Preston wheat, two with Mensury barley, and two with Banner oats. One plot in each case had clover sown with the grain at the rate of 12 pounds per acre; the other had no clover. The soil was a sandy loam of fairly good quality, and up to this time the land had been used as a nursery. After the grain was cut, the land was left untouched until the following spring, by which time the clover had made a good growth, when it was ploughed under to the depth of 6 or 7 inches. The land was then harrowed twice with a disc-harrow and twice with a smoothing harrow. The corn was sown with the seed-drill, on May 25, in rows three feet apart and cut for ensilage on September 13. The variety used for this test was Longfellow.

No. of Plot.	Variety.	Height.	Leafiness.	Late Milk.	Condition when cut.	Weight per acre grown in rows.	
	Longfellow Corn Sown After.	Inches.				Tons.	Lbs.
1	Oats Banner, 1899, no clover...	80—90	Leafy ...	Late milk.....	Late milk.....	14	1800
2	Oats Banner, 1899, with clover. ...	84—96	"	"	"	18	1720
3	Barley Mensury, 1899, no clover...	84—94	"	"	"	16	1440
4	Barley Mensury, 1899, with clover.	86—96	"	" ...	"	17	1120
5	Wheat Preston, 1899, no clover....	84—94	"	"	"	16	1160
6	Wheat Preston, 1899, with clover..	86—98	" ...	"	" ...	19	1560

While the effect as shown by the figures given has been very decided, the clover was sown in this instance also, too late for the best results to be obtained.

INCREASE IN THE YIELD OF POTATOES BY THE PLOUGHING UNDER OF GREEN CLOVER.

In the spring of 1899, six plots of one-fortieth acre each were sown with grain, two with Preston wheat, two with Mensury barley and two with Banner oats. One plot in each case had clover sown with the grain, at the rate of 12 pounds per acre, the other had no clover. The soil was a sandy loam. In the spring of 1900, the clover was ploughed under, and the plots were all planted with one variety of potatoes, Rochester Rose. These were planted on May 28, came up June 15, and were dug October 5, with the following results :—

	Yield per acre. Bus.	Lbs.
Plot No. 1, on which Preston wheat was sown in 1899, without clover......	280	40
Plot No. 2, on which Preston wheat was sown in 1899, with clover......	320	..
Plot No. 3, on which Banner oats was sown, without clover..	290	40
Plot No. 4, on which Banner oats was sown, with clover....	301	20
Plot No. 5, on which Mensury barley was sown, without clover.	280	..
Plot No. 6, on which Mensury barley was sown, with clover..	330	..

EFFECTS OF FERTILIZERS ON SPRING WHEAT AND OATS.

During the past season two series each, consisting of sixteen one-eightieth acre plots, have been laid out, twelve of which in each set have been treated with different fertilizers, and the remaining four left as check plots, receiving no fertilizers. One set of these plots has been sown with spring wheat of the variety known as Preston, the other with Ligowo oats.

The object in view in this test is to watch the effects on land in a fair average condition of fertility, of barn-yard manure fresh and rotted, fresh slaked lime, nitrate

of soda, superphosphate and Thomas' Phosphate, all used singly. Also, of superphosphate with kainit and with kainit and nitrate of soda, and of Thomas' Phosphate with kainit, and also with kainit and nitrate of soda.

The land chosen for this test was in a fairly good condition of tilth. The soil was a sandy loam, which had been under cultivation since 1887, and has been cropped each year since with a suitable rotation of crops, and has received a dressing of barn-yard manure about once in four years. The last application of manure was in 1897, when it received about twelve tons per acre. The land was cropped in 1899 with experimental grain plots, mostly barley.

It is proposed to grow the same crops on this land for a series of years, using the same fertilizers in the same quantities every second year. In this way it is hoped that some further information may be gained as to the effect of these different fertilizers when used singly and in combination on the two important crops named. As this land was in a fair average condition as to fertility, it may be regarded as representing in a general way, average sandy loams on farms properly worked.

RESULTS OF THE APPLICATION OF FERTILIZERS TO SPRING WHEAT.

No. of Plot.	Name of Variety.	Date of Sowing.	Date of Ripening.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	Rusted.
				Inches.		Inches.		Bush. Lbs.	
1	Superphosphate, 400 lbs. per acre	May 11.	Aug. 16.	40 to 43	Stiff	3 to 4	Bearded	25 20	Slightly.
2	Thomas' phosphate, 400 lbs. per acre	" 11.	" 16.	40 43	"	3 4	"	25 20	"
3	Thomas' phosphate, 800 lbs. per acre	" 11.	" 16.	40 43	"	3 4	"	25 20	"
4	Check	" 11.	" 16.	40 43	"	3 4	"	26 40	"
5	Thomas' phosphate, 400 lbs. kainit, 200 lbs. per acre	" 11.	" 16.	40 43	"	3 4	"	26 40	"
6	Superphosphate, 400 lbs. kainit, 200 lbs. per acre	" 11.	" 16.	40 43	"	3 4	"	24 40	"
7	Check	" 11	" 16.	40 43	"	3 4	"	25 20	"
8	Thomas' phosphate, 400 lbs. kainit, 200 lbs. nitrate soda, 100 lbs. per acre	" 11.	" 16.	40 43	"	3 4	"	26 00	"
9	Superphosphate, 400 lbs. kainit, 200 lbs. nitrate soda, 100 lbs. per acre	" 11	" 16	40 43	"	3 4	"	26 00	"
10	Barn-yard manure, mixed, horse and cow, fresh, 12 tons, per acre	" 11.	" 16	40 43	"	3 4	"	24 00	"
11	Barn-yard manure, mixed, horse and cow, well rotted, 12 tons, per acre	" 11.	" 16.	40 43	"	3 4	"	22 40	"
12	Check	" 11	" 16	40 43	"	3 4	"	21 20	"
13	Fresh slacked lime, 1,000 lbs. per acre	" 11.	" 16.	30 36	"	2½ 3½		12 00	"
14	Nitrate soda, 100 lbs. per acre	" 11.	" 16.	32 36	"	3 3½		16 00	"
15	Check	" 11	" 16	32 36	"	3 3½		16 00	"
16	Nitrate soda, 200 lbs. per acre	" 11.	" 16.	32 36	"	3 3½		13 20	"

The falling off in yield from plots 13 to 16 inclusive may be attributed partly to the land being lighter and of poorer quality.

RESULTS OF THE APPLICATION OF FERTILIZERS TO OATS.

No. of Plot.	Name of Variety.	Date of Sowing.	Date of Ripening.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Rusted.
				Inches.		Inches.		Bush.	Lbs.	
1	Superphosphate, 400 lbs. per acre........	May 11.	Aug. 16.	45 to 50	Stiff....	8 to 9½	Branching	70	20	Slightly
2	Thomas' phosphate, 400 lbs. per acre..........	" 11.	" 16.	45 50	" ...	8 9½	" ..	72	22	"
3	Thomas' phosphate, 800 lbs. per acre...	" 11.	" 16.	45 50	" ...	8 9½	" ..	72	22	"
4	Check..................	" 11.	" 16.	45 50	" ...	8 9½	" .	75	10	"
5	Thomas' phosphate, 400 lbs. kainit, 200 lbs. per acre..................	" 11.	" 16.	45 50	" ...	8 9½	" ..	70	20	"
6	Superphosphate, 400 lbs., kainit, 200 lbs. per acre	" 11.	" 16.	45 50	" ..	8 9½	" ..	73	18	"
7	Check..	" 11.	" 16.	45 50	" ...	8 9½	" ..	73	18	"
8	Thomas' phosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre	" 11.	" 16.	45 50	" ...	8 9½	" ..	70	20	"
9	Superphosphate, 400 lbs., kainit, 200 lbs., nitrate soda, 100 lbs. per acre..	" 11.	" 16.	45 50	" ...	8 9½	" ..	68	8	"
10	Barn-yard manure, mixed horse and cow, fresh, 12 tons per acre ...	" 11.	" 16.	45 50	" ...	8 9½	" ..	71	26	"
11	Barn-yard manure, mixed horse and cow, well rotted, 12 tons per acre	" 11.	" 19.	45 50	" ...	8 9½	" ..	72	32	"
12	Check......	" 11.	" 16.	45 50	" ...	8 9½	" ..	72	32	"
13	Fresh slacked lime, 1,000 lbs. per acre..........	" 11.	" 16.	45 50	" ...	8 9½	" ..	68	8	"
14	Nitrate soda, 100 lbs. per acre..	" 11.	" 15.	45 50	" ...	8 9½	" ..	72	32	"
15	Check......	" 11.	" 16.	45 50	" ...	8 9½	" ..	68	8	"
16	Nitrate soda, 200 lbs. per acre..............	" 11.	" 16.	45 50	" ...	8 9½	" ..	65	30	"

In this series of tests the check plots to which no fertilizers have been applied, have given crops averaging about as large as any of the plots on which fertilizers have been used. This would seem to show that the land this season contained all the available plant food which the crops could utilize. With the partial exhaustion which will be produced by several successive crops the relative usefulness of the different fertilizers will probably be more clearly manifest.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

In the annual report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which were carried on during the previous five or six years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important farm crops. The particulars there given covered the results of six years' experience with crops of wheat and Indian corn and five years' experience with crops of oats, barley, turnips and mangels. The results of similar tests conducted for three years with carrots and one year with sugar beets were also given.

These experiments have been continued ; and as explanatory regarding the preparations made and the general plan together with the way in which they have been carried on, the following paragraphs are quoted from the report of 1893 :—

'A piece of sandy loam, more or less mixed with clay, which was originally covered with heavy timber, chiefly white pine, was chosen for these tests. The timber was cut many years ago, and among the stumps still remaining when the land was purchased, there had sprung up a thick second growth of trees, chiefly poplar, birch and maple, few of which exceeded 6 inches in diameter at the base. Early in 1887, this land was cleared by rooting up the young trees and stumps and burning them in piles, on the ground from which they were taken, the ashes being afterwards distributed over the soil as evenly as possible, and the land ploughed and thoroughly harrowed. Later in the season it was again ploughed and harrowed, and most of it got into fair condition for cropping.

'The plots laid out for the experimental work with fertilizers were one-tenth of an acre each, 21 of which were devoted to experiments with wheat, 21 to barley, 21 to oats, 21 to Indian corn or maize, and 21 to experiments with turnips and mangels. It was not practicable to undertake work on all the plots the first season. The tests were begun in 1888 with 20 plots of wheat and 16 of Indian corn, and in 1889 all the series were completed excepting six plots of roots, Nos. 16 to 21 inclusive, which were available for the work in 1890.' In all cases the plots in each series have been sown on the same day.

'In 1890 it was found that all the grain plots had become so weedy that the growth of the crops was much interfered with, and with the view of cleaning the land one-half of each of the wheat and oat plots was sown with carrots in 1891, and one-half of each of the barley plots with sugar beets. In 1892 the other half of each plot in each of these series was sown with carrots. In 1893 it was thought desirable to continue this cleaning process, and carrots were again sown on the half of the wheat and oat plots occupied with this crop in 1891, and also the half of the barley plots cropped with sugar beets that year.' In 1894, 1895, 1896, 1897 and 1898 the one-half of the oat plots were sown again with carrots and the half of the plots devoted to wheat and barley were planted with potatoes.

TREATMENT OF SOIL.

'The treatment of the soil on all the grain plots has been to gang-plough soon after harvest, and after the shed grain and weeds have well started to plough again later, about 7 inches deep. In spring the plots have been gang-ploughed once before applying the fertilizers, which are then scattered over the surface and harrowed with the smoothing harrow before sowing. On those plots where barn-yard manure has been used, the manure has been lightly ploughed under as soon as possible after it has been spread on the land and just before sowing. Wherever barn-yard manure is spoken of, it is understood to be a mixture of horse and cow manure in about equal proportions.'

A summary of these permanent fertilizer plots is given each year, taking the average yield of the whole previous period, adding the results of the current year, and then giving the average yield for the full time.

OBJECTS IN VIEW IN CONDUCTING THESE EXPERIMENTS.

It should be distinctly understood that in establishing and conducting this series of experiments, the object in view has been to gain as much information as possible as to the actual effects of certain fertilizers and combinations of fertilizers on particular crops. These experiments were never intended to serve as model test plots such as farmers could copy to advantage in their general practice. On the contrary, to gain the information desired, it has been found necessary to use some fertilizers in extravagant quantities, and in other instances to more or less exhaust the soil by a succession of crops of the same sort, practices which in ordinary farming would be

detrimental. Nevertheless, much useful information has been acquired, some of a positive and some of a negative character, by this long-conducted and extensive series of tests. The information now gained from year to year throws light in many ways on the action of fertilizers and is increasingly useful.

VALUABLE INFORMATION GAINED.

As results of these trials, it has been shown that barn-yard manure can be most economically used in the fresh or unrotted condition; that fresh manure is equal, ton for ton, in crop-producing power to rotted manure, which, other experiments have shown, loses during the process of rotting about 60 per cent of its weight. In view of the vast importance of making the best possible use of barn-yard manure, it is difficult to estimate the value of this one item of information.

At the time when these experiments were planned, the opinion was very generally held that untreated mineral phosphate, if very finely ground, was a valuable fertilizer, which gradually gave up its phosphoric acid for the promotion of plant growth. Ten years' experience has shown that mineral phosphate, untreated, is of no value as a fertilizer.

The use of sulphate of iron, which at the time these tests were begun, was highly recommended by an authority at that time eminent, as a reliable means of producing increased crops, has also been proven to be almost useless for this purpose.

Common salt, which has long had a reputation with many farmers for its value as a fertilizer for barley, while others disbelieved in its efficacy, has been shown to be a most valuable agent for producing an increased crop of that grain, while it is of much less use when applied to crops of spring wheat or oats. Land plaster or gypsum has also proven to be of some value as a fertilizer for barley, while of very little service for wheat or oats. Some light has also been thrown on the relative usefulness of single and combined fertilizers.

CHANGES MADE IN THE EXPERIMENTS.

After ten years' experience had demonstrated that finely-ground, untreated mineral phosphate was of no value as a fertilizer, its use was discontinued in 1898. Prior to this it had been used in each set of plots in Nos. 4, 5, 6, 7 and on No. 8, also in all the different series of plots, excepting roots. In 1898 and 1899, similar weights of the Thomas' phosphate was used in place of the mineral phosphate, excepting in plot 6 in each series. In this plot the Thomas' phosphate was used in 1898 only.

After constant cropping for ten or eleven years, it was found that the soil on those plots to which no barn-yard manure had been applied was much depleted of humus, and hence its power of holding moisture had been lessened and the conditions for plant growth, apart from the question of plant food, had on this account become less favourable. In 1899 the experiments were modified and an effort made to restore some proportion of the humus and at the same time gain further information as to the value of clover as a collector of plant food. In the spring of that year 10 pounds of red clover seed per acre was sown with the grain on all the plots of wheat, barley and oats. The clover seed germinated well, and after the grain was cut the young clover plants made rapid growth and by the middle of October there was a thick mat of foliage varying in height and density on the different plots, which was ploughed under. The growing of carrots and potatoes on one-half of the cereal plots has been discontinued since 1898 and each plot of the wheat, barley and oats has occupied the full tenth of an acre.

In 1890 clover was again sown on all the plots, which produced a good growth during the season and was ploughed under in October.

APPLICATION OF FERTILIZERS DISCONTINUED.

Another direction in which information was sought was in reference to the length of time which a liberal application of barn-yard manure would continue to affect subsequent crops, and in 1899 on plots 1, 2 and 6 the barn-yard manure, which had been used for ten or eleven years in succession, was discontinued. The phosphate fertilizer was also omitted on plot 6 in each series.

In 1900 all the fertilizers on all the plots were discontinued, and it is proposed to continue to grow the same crops on all these plots from year to year without fertilizers for some years, sowing clover with the grain each season. In this way it is expected that much information will be gained as to the value of clover as a collector of plant food, and also as to the unexhausted values of the different fertilizers which have been used on these plots since the experiments were begun.

SPECIAL TREATMENT OF PLOTS OF INDIAN CORN AND ROOTS.

As it was not practicable to sow clover to advantage on the Indian corn and root plots, the sowing of these latter crops was discontinued in the spring of 1900 and clover sown in their place in the proportion of 12 pounds per acre, and no fertilizers were applied. The clover on these plots has made strong growth, so strong as to necessitate twice cutting during the season, the cut clover being left on the ground in each case to decay and thus add to the fertility of the soil, and will be left over for further growth next spring and ploughed under for the roots about May 1 and for corn about the middle of that month. Then roots and Indian corn will again be sown. This course will be continued for some years, growing Indian corn and roots every second year, and common red clover the alternate season. No fertilizers were applied in 1900, and it is proposed to discontinue their use entirely for some years, so that the effect on these crops of the ploughing under of clover every second year may be carefully studied under the varying conditions presented by these more or less exhausted plots.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of 1½ bushels per acre, excepting in 1894 ; and the varieties used were as follows:—In 1888-89-90 and 1891, White Russian, and in 1892-3, Campbell's White Chaff. In 1894, the Rio Grande wheat was used, when, owing to lack of germinating power in the seed, a larger quantity was required. In 1895, 1896, 1897, 1898, 1899 and 1900, Red Fife wheat was used in the usual quantity of 1½ bushels per acre. In 1900, the Red Fife was sown May 5, came up May 18, and was ripe from August 17 to 18.

The season of 1899 was favourable for the growing of spring wheat at Ottawa and has given in most instances crops above the average.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT $\frac{1}{10}$th ACRE EACH.

No. of Plot.	Fertilizers applied each Year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Twelve Years.			13th Season, 1900. Variety, Red Fife.			Average Yield for Thirteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure has been applied since then.	21	10	3,839	24	45	5,475	21	$26\frac{7}{13}$	3,965
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure has been applied since then.	21	$26\frac{4}{12}$	3,883	29	40	5,500	22	$4\frac{4}{13}$	4,007
3	Unmanured from the beginning.	10	$17\frac{11}{12}$	1,849	13	45	2,155	10	$33\frac{11}{13}$	1,873
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' Phosphate was used. No fertilizer has been applied since then	10	$22\frac{11}{12}$	1,965	15	10	2,770	10	45	2,027
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	12	$31\frac{8}{12}$	2,842	13	..	3,005	12	$33\frac{11}{13}$	2,855
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898 500 lbs. of Thomas' Phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	18	$26\frac{6}{12}$	3,206	22	50	4,430	18	$46\frac{10}{13}$	3,300
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	12	$43\frac{10}{12}$	2,372	13	20	4,165	12	$46\frac{8}{13}$	2,510
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' Phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	10	$42\frac{4}{12}$	1,980	12	15	3,260	10	$49\frac{6}{13}$	2,078
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.	11	$36\frac{6}{12}$	1,809	11	55	2,865	11	$37\frac{12}{13}$	1,890
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.	12	$57\frac{11}{12}$	3,041*	12	..	2,880	12	$53\frac{6}{13}$	3,029

* This plot suffered from water in 1900.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT $\frac{1}{10}$th ACRE EACH—*Continued.*

No. of Plot.	Fertilizers applied each Year from 1888 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Twelve Years.			13th Season, 1900. Variety, Red Fife.			Average Yield for Thirteen Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. No fertilizer has been applied since then	13	$55\frac{10}{12}$	2,736	18	20	3,835	14	$16\frac{2}{13}$	2,821
12	Unmanured from the beginning	9	$40\frac{5}{12}$	1,742	11	10	2,880	9	$47\frac{4}{13}$	1,830
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	11	$43\frac{2}{12}$	1,900	15	40	2,740	12	$1\frac{5}{13}$	1,965
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	15	$9\frac{2}{12}$	2,360	14	50	3,840	15	$7\frac{9}{13}$	2,474
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	13	$17\frac{11}{12}$	2,320	16	35	2,840	13	$33\frac{1}{13}$	2,360
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	15	$19\frac{5}{12}$	2,067	15	40	2,935	15	21	2,134
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	12	$5\frac{2}{12}$	2,332	16	10	2,480	12	24	2,343
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	12	$26\frac{3}{12}$	1,881	12	45	1,785	12	$27\frac{9}{13}$	1,874
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	13	$20\frac{5}{12}$	1,486	14	25	1,965	13	$25\frac{5}{13}$	1,523
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	12	30	1,880	11	45	2,010	12	$26\frac{7}{13}$	1,890
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer has been used since then	12	$33\frac{2}{12}$	1,895	14	40	1,720	12	$42\frac{12}{13}$	1,882

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889, 1890 and 1891, 1½ bushels in 1892 and 1893, and 2 bushels in 1894, 1895, 1896, 1897, 1898, 1899 and 1900. Two-rowed barley has been used for seed throughout the whole period. The varieties used were as follows: 1889, 1890 and 1891, Saale; 1892, Goldthorpe; 1893, Duck-bill; and in 1894, 1895, 1896, 1897, 1898, 1899 and 1900, Canadian Thorpe, a selected form of the Duck-bill. In 1900 the Canadian Thorpe was sown on May 7, came up May 18 and was harvested from August 1 to 8.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY, $\frac{1}{10}$TH ACRE EACH.

No. of plot.	Fertilizers applied each Year from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Eleven Years.			12th Season, 1890. Variety, Canadian Thorpe.			Average Yield for Twelve Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush	lbs.	Lbs.	Bush	lbs.	Lbs.	Bush	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898 inclusive. No manure has been applied since then.....	34	$35\frac{5}{11}$	3,034	36	22	2,860	34	$42\frac{4}{12}$	3,019
2	Barn-yarn manure, fresh, 15 tons per acre, each year to 1898 inclusive. No manure has been applied since then............	35	$14\frac{7}{11}$	3,260	34	33	2,520	35	$12\frac{2}{12}$	3,198
3	Unmanured from the beginning... ...	13	$20\frac{1}{11}$	1,546	9	33	1,135	13	$5\frac{2}{12}$	1,512
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used, no fertilizer has been applied since then................	13	$47\frac{2}{12}$	1,444	16	2	1,275	14	$7\frac{5}{12}$	1,430
5	Mineral phosphate, untreated, finely ground; 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then	19	$35\frac{10}{11}$	2,232	26	2	2,270	20	$13\frac{1}{12}$	2,235
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	27	$44\frac{2}{11}$	2,404	26	27	2,080	27	$38\frac{9}{12}$	2,377
7	Mineral phosphate, untreated, finely ground, 500 lbs; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.............	23	34	2,391	32	24	2,520	24	$21\frac{2}{12}$	2,402
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas's phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	19	$26\frac{2}{11}$	1,688	20	45	1,980	19	$31\frac{9}{12}$	1,712
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been used since then..............	20	$35\frac{5}{11}$	1,871	18	21	1,105	20	$26\frac{3}{12}$	1,807
10	Mineral superphosphate. No. 1, 350 lbs; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then. ...	27	$2\frac{2}{11}$	2,369	31	42	2,220	28	$13\frac{6}{12}$	2 357

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY, $\frac{1}{10}$TH ACRE EACH.

No. of plot.	Fertilizers applied each year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Eleven Years. Yield of Grain. Per acre.		Average Yield for Eleven Years. Yield of Straw. Per acre	12th Season, 1900. Variety, Canadian Thorpe. Yield of Grain. Per acre.		12th Season, 1900. Yield of Straw. Per acre	Average Yield for Twelve Years. Yield of Grain. Per acre.		Average Yield for Twelve Years. Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. No fertilizer has been applied since then.....	26	$8\frac{4}{11}$	2,516	26	32	2,395	26	$10\frac{4}{12}$	2,506
12	Unmanured from the beginning.....	13	1	1,211	11	32	1,260	12	$43\frac{7}{12}$	1,215
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	13	$33\frac{3}{11}$	1,375	16	7	1,905	13	$43\frac{1}{12}$	1,419
14	Bone, finely ground 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.....	22	19	2,010	25	35	2,370	22	$32\frac{4}{12}$	2.040
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	21	37	2,329	23	6	2,325	21	$42\frac{5}{12}$	2,329
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.....	22	$3\frac{1}{11}$	1,836	22	39	1,725	22	$6\frac{1}{12}$	1,827
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then....	18	$11\frac{5}{11}$	1,987	23	16	1,340	18	$31\frac{10}{12}$	1,933
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.....	17	$34\frac{5}{11}$	1,741	20	15	1,150	17	$44\frac{9}{12}$	1,692
19	Common salt (Sodium chloride) 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then.....	27	$44\frac{5}{11}$	2,056	23	26	1,580	27	$26\frac{11}{12}$	2,016
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre used each year from 1888 to 1899 inclusive. No fertilizer has been applied since then	19	$22\frac{1}{11}$	1,632	21	7	1,310	19	$28\frac{10}{12}$	1,605
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer has been applied since then......	20	$7\frac{8}{11}$	1,826	20	15	1,445	20	$8\frac{4}{12}$	1,794

OAT PLOTS.

The quantity of seed sown per acre on the oat plots, was 2 bushels in 1889 and 1890 ; **1½ bushels in 1891, 1892 and 1893, and 2 bushels in 1894, 1895, 1896, 1897, 1898, 1899 and 1900. The varieties used were as follows : In 1889, Early English ; in 1890, 1891, 1892 1893, Prize Cluster ; and in 1894, 1895, 1896, 1897, 1898 1899 and 1900, Banner. In 1900 the Banner was sown May 5, came up May 19, and the plots were harvested from August 15 to 17.**

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS, $\frac{1}{10}$ ACRE EACH.

Number of Plot.	Fertilizers applied each Year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Eleven Years.			12th Season, 1900. Variety, Banner.			Average Yield for Twelve Years.		
		Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.		Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898 inclusive. No manure has been applied since then.....	49	$3\frac{1}{11}$	3,136	69	9	3,520	50	$26\frac{3}{12}$	3,168
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898 inclusive. No manure has been applied since then............	54	$18\frac{6}{11}$	3,345	66	21	3,665	55	$18\frac{9}{12}$	3,372
3	Unmanured from the beginning	30	$20\frac{5}{11}$	1,484	47	2	1,955	31	$33\frac{1}{12}$	1,523
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer has been applied since then......	30	$23\frac{3}{11}$	1,691	42	12	1,660	31	$22\frac{7}{12}$	1,688
5	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.....	48	$21\frac{2}{11}$	2,719	52	17	2,235	48	$32\frac{2}{12}$	2,679
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then.	45	$1\frac{9}{11}$	2,569	71	6	3,115	47	$7\frac{10}{12}$	2,615
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then...........	46	$9\frac{5}{11}$	3,161	65	15	3,025	47	$29\frac{9}{12}$	3,150
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizer has been applied since then...... ..	40	$8\frac{2}{11}$	2,275	51	16	3,430	41	6	2,371
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been used since then	35	$\frac{10}{11}$	1,938	51	31	1,840	36	$14\frac{9}{12}$	1,930
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	46	21	2,772	53	28	2,275	47	$7\frac{5}{12}$	2,731

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS, $\frac{1}{10}$ ACRE EACH—*Continued.*

Number of Plot.	Fertilizers applied each Year, from 1889 to 1898 or 1899. No fertilizers used since. Clover sown in 1899 and each year since with the grain and ploughed under in the Autumn.	Average Yield for Eleven Years. Yield of Grain. Per acre.		Average Yield for Eleven Years. Yield of Straw. Per acre	12th Season, 1900. Variety. Banner. Yield of Grain. Per acre.		12th Season, 1900. Variety. Banner. Yield of Straw. Per acre	Average Yield for Twelve Years. Yield of Grain. Per acre.		Average Yield for Twelve Years. Yield of Straw. Per acre
		Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.	Bush.	lbs.	Lbs.
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. No fertilizer has been applied since then	36	$4\frac{9}{11}$	2,376	45	20	2,830	36	$31\frac{7}{12}$	2,414
12	Unmanured from the beginning...........	21	$9\frac{7}{11}$	1,493	26	31	1,035	21	$25\frac{7}{12}$	1,455
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	33	$25\frac{8}{11}$	1,960	41	16	2,295	34	$13\frac{7}{12}$	1,988
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then ..	37	$27\frac{10}{11}$	2,176	62	2	2,495	39	$28\frac{7}{12}$	2,203
15	Nitrate of soda, 200 lbs per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then....	46	$7\frac{4}{11}$	2,684	64	19	2,705	47	$25\frac{4}{12}$	2,686
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	34	24	2,103	55	10	2,270	36	$14\frac{4}{12}$	2,117
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	43	$21\frac{7}{11}$	2,958	51	31	2,335	44	$11\frac{1}{12}$	2,906
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then ...	35	$13\frac{3}{11}$	2,078	44	29	1,675	36	$6\frac{1}{2}$	2,044
19	Common salt (Sodium chloride) 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then......	35	$5\frac{10}{11}$	1,931	43	8	1,830	35	$28\frac{9}{12}$	1,923
20	Land plaster or gypsum (Calcium sulphate) 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer has been applied since then.	32	$24\frac{8}{11}$	1,995	39	9	1,670	33	$9\frac{3}{12}$	1,968
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer has been applied since then...	33	$6\frac{7}{11}$	1,851	49	4	1,580	34	$17\frac{9}{12}$	1.828

METEOROLOGICAL OBSERVATIONS.

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1900 ; maximum, minimum and mean temperature for each month, with date of occurrence, also Rainfall and Snowfall.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days' Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		In.	In.	In.		In.	
Jan	26·02	3·90	22·11	14·95	39·0	23rd	—11·5	24th	0·54	15·00	2·04	15	5·00	12th
Feb	24·29	8·01	17.91	16·96	41·0	9th	—21·5	2nd	1·95	14·75	3·42	11	4·50	5th
March ..	27·52	7·42	20·10	17·47	42·0	19th	—14·2	18th	0·08	40·00	4·08	13	12·00	2nd
April ...	55·36	34·13	21·23	44·74	75·0	21st	20·0	9th	1·12	...	1·12	7	0·48	18th
May	66·04	40·72	25·32	53·38	86·2	14th	26·5	11th	3·70	......	3·70	14	1·50	8th
June	78·19	55·15	23·04	66·67	86·8	27th	46·0	4th	3·83	......	3·83	13	1·73	2nd
July	78·69	58·36	20·32	68·52	88·2	7th	48·8	1st	6·45	......	6·45	16	2·34	17th
August .	79·66	57·82	21·84	68·74	91·2	25th	48·0	4th	2·84	......	2·84	12	0·99	7th
Sept ..	70·65	51·10	19·55	60·87	93·8	2nd	36·0	19th	4·15	......	4·15	14	0·77	16th
Oct	64·42	43·00	21·41	53·70	79·6	4th	24·0	20th	1·61	......	1·61	11	0·46	8th
Nov	39·99	26·25	13·73	33·11	63·8	1st	4·9	17th	3·00	17·00	4·70	22	6·00	19th
Dec	24·75	8·33	16·41	16·53	38·0	20th	—15·8	10th	0·21	21·25	2·33	19	6·00	5th & 13th
									29·48	108·00	40·27	167		

Rain or snow fell on 167 days during the 12 months.
Heaviest rainfall in 24 hours, 2·34 inches on July 17.
Heaviest snowfall in 24 hours, 12·00 on March 2.
It will be seen the highest temperature during the 12 months was 93·°8 on September 2.
The lowest temperature during the 12 months was —21·°5 on February 2.
During the growing season rain fell on 7 days in April, 14 days in May, 13 days in June, 16 days in July, 12 days in August and 14 days in September.
April shows the lowest number of days on which rain fell, viz., 7.
Rain or snow fell on 22 days in November.
Total precipitation during the 12 months, 40·27 inches, as compared with 41·63 inches during 1899.

RAINFALL, Snowfall and total Precipitation from 1890 to 1900, also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
	Inches.	Inches.	Inches.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	36·02
1899	33·86	77·25	41·63
1900	29·48	108·00	40·27
Total	294·35	961·10	390·54
Yearly average for 11 years	26·75	87·37	35·50

RECORD of Sunshine at Central Experimental Farm, Ottawa, for the Years 1898, 1899 and 1900.

Months.	1898.				1899.				1900.			
	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
January	21	10	97·4	3·14	18	13	91·2	2·94	18	13	96·4	2·46
February	15	13	67·5	2·41	19	9	102·1	3·64	20	8	110·2	3·93
March	26	5	171·5	5·53	17	14	124·1	4·00	26	5	177·9	5·73
April	29	1	233·8	7·79	26	4	228·8	7·62	26	4	212·7	7·09
May	30	1	186·3	6·01	27	4	225·4	7·27	27	4	241·6	7·79
June	29	1	184·9	6·16	29	1	257·1	8·57	27	3	282·2	9·40
July	30	1	272·8	8·80	29	2	271·3	8·75	29	2	225·1	7·26
August	Instrument out of order.				31	0	271·2	8·74	30	1	270·7	8·73
September	27	3	166·9	5·23	22	8	128·9	4·29	22	8	164·4	5·48
October	21	10	106·0	3·41	23	8	120·4	3·88	26	5	148·7	4·79
November	21	9	91·3	3·04	17	13	77·0	2·56	18	12	71·7	2·39
December	15	16	54·3	1·75	17	14	50·1	1·61	16	15	34·0	1·09

WILLIAM T. ELLIS,
Observer.

VISIT TO GREAT BRITAIN AND FRANCE.

On July 21, I took passage in the steamer *Dominion*, from Montreal, and after a very pleasant journey arrived in Liverpool on the 31st of the month.

VISIT TO GARTON BROS., WARRINGTON.

One of the first places visited in England was the establishment of Garton Bros., a firm well-known for the useful and interesting work they have done in the cross-fertilizing of cereals. Their seed establishment is at Warrington, about an hour's ride by rail from Liverpool, while their experimental grounds are at Newton le Willows, some 6 or 7 miles distant from Warrington. After looking carefully over the interesting samples of new sorts of grain shown at the seed warehouse, I was driven to the experimental grounds, where under the guidance of the senior member of the firm, the grounds were inspected. These included a very large number of plots of different varieties of cereals, among which there were many new sorts of wheat with heads of various forms and sizes. Among the crosses of Miracle or Eldorado wheat, *Triticum turgidum*, there were some very curious things, also some very large and robust looking heads, crosses of Greek Summer wheat, *Triticum durum*, with other varieties. Many fine new strains of the ordinary winter wheat were also seen.

In barley there were a number of interesting sorts, one of which is said to be very stiff in the straw, and another to have smut-resisting qualities.

The work which has been done by the Garton Bros. in oats interested me much. In some of their new crosses the naked oat of China has been used as one of the

parents, and evidence of the influence of this oat on the progeny is visible in the character of the panicle, in which the number of grains in the cluster is increased. These crosses seem likely to be very productive. Sufficient quantities of some of the more promising of these new cereals have been secured for experimental tests in Canada.

AGRICULTURAL EDUCATION AND EXPERIMENTAL AGRICULTURE IN ENGLAND.

A large sum is annually paid by the government of Great Britain to the forty-nine County Councils of England for technical education. This amounted to £826,450 in 1897-8, and £834,908 in 1898-9, being an average of over four million dollars per annum. A proportion of this is spent in educational and experimental work in agriculture. The total amount spent during the past year for the promotion of agriculture was about £80,000, nearly $400,000. The work is carried on in many different ways, but a considerable sum is spent in conducting agricultural field experiments, a large proportion of which are experiments with manures on various crops. Other sums are devoted to horticulture, dairying, poultry keeping, bee keeping, farriery, &c. In many instances this work is carried on *directly* under control of committees of the council, who establish agricultural and horticultural schools, and dairy institutions, direct field experiments in agriculture, arrange for competitions in ploughing, hedging, ditching, horse-shoeing, &c., give scholarships in agriculture to those attending schools and colleges, organize travelling dairies and employ lecturers in agriculture and horticulture, who visit and address farmers in different parts of the county. Reports are also published of the work carried on.

Further grants for special work in connection with agricultural education and research are given by the Board of Agriculture. These grants in 1898, amounted in all to £7,350, nearly $36,750. The sums given vary from £50 to £800.

There is thus a considerable amount of money spent in promoting agriculture in England, much of which is no doubt well used, but in other instances monies are probably less judiciously expended.

The following are cited as examples of expenditure:—Surrey, a county which spends from £4,000 to £5,000 in connection with agricultural education, is said to spend this sum in part *directly* under control of a committee of the council on horticultural school gardens, instruction at shows, and on allotments and scholarships, and *indirectly* instruction is given in bee keeping, under direction of the Berks Bee Keepers' Association, and demonstrations in field experiments by the University Extension College at Reading, an institution which this county conjointly with other counties supports.

The county of Cornwall, which spends from £1,200 to £1,500 yearly, expends this directly through the technical instruction committee, assisted by local district committees.

Experiments are conducted in the manuring of permanent pastures, turnips and other crops. Experiments are also conducted with different sorts of fruits.

In several instances two or more counties combine in carrying on experimental work or in maintaining agricultural schools, for example Durham, Cumberland, and Northumberland combine in maintaining the agricultural work of the Durham College of Science.

VISIT TO COCKLE PARK.

A visit was paid to the experimental farm worked by these three counties, known as Cockle Park, which is about ten miles from Newcastle-on-Tyne, and consists of about 450 acres. Many experiments were in progress there with fertilizers on different crops ; some varietal tests are conducted with oats, including some of the new varieties

of Garton Bros. Trials are also made of rotation plots. A number of experiments were in progress in the fattening and breeding of sheep, and in testing the effects of fertilizers on the nutritious qualities of pasture grasses. Experiments have also been tried with lime as a preventive of finger and toe disease in turnips, using it in varying quantities, from 1,000 to 8,000 pounds per acre. Experiments covering several acres are in progress in tree growth, ten blocks of half an acre each or less being devoted to this purpose. A well stocked and well kept nursery is also an interesting feature on this farm. Excellent work along many useful lines has been carried on at this institution for the past seven years, under the able management of Prof. Wm. Somerville, who has recently been appointed Professor of Agriculture at Cambridge University.

EXPERIMENTAL GROUNDS AT LAUNCESTON, CORNWALL.

The experimental grounds at Launceston, Cornwall, were also visited. This is one of three stations carried on by the County Council of Cornwall. This station was entirely devoted to experiments in horticulture. The land occupied was about two acres, a short distance from the town of Launceston. The soil was a good clay loam, and most of the land was occupied by different varieties of apple, pear and plum trees, some of which were beginning to bear. The varieties were mostly of the well-known standard sorts. A small area was devoted to the testing of raspberries, strawberries, gooseberries, and red and black currants. Tests were also being made with tomatoes.

READING COLLEGE AND BRITISH DAIRY INSTITUTE.

A pleasant day was spent at Reading, in visiting Reading College and the British Dairy Institute. Under the guidance of Prof. D. A. Gilchrist, director of the agricultural department, I was shown through the buildings, and learned much regarding the working of these useful institutions. The College and Institute occupy adjoining sites in the town of Reading, within a few minutes walk of the railway stations. The College was founded in 1892; the British Dairy Institute, which was established at Aylesbury in 1888, by the British Dairy Farmers' Association, was removed to Reading in 1896, to the newly-erected building, where it was placed under the management of a joint committee, representing the British Dairy Farmers' Association and Reading College.

The building of the British Dairy Institute is very complete in its appliances for practical teaching and experimental work. In addition to the well-arranged lecture rooms and reading room, it has large milk-receiving, butter-making and milk-testing rooms, four rooms for the manufacture of pressed, unpressed and soft cheeses, and seven rooms for the ripening of different varieties of cheese.

The higher certificate in dairying is granted to successful students who have spent one year at the college, six months at an approved dairy institute, and six months on a dairy farm.

A short course in dairy instruction is also provided, of ten weeks, when successful candidates receive certificates.

Reading College is managed by a council, in which are representatives of the County Councils of Berkshire, Buckinghamshire, Dorset, Hampshire and Oxfordshire, subsidies being granted by all these bodies to meet the cost of carrying on the agricultural work of the institution. The College is affiliated with Oxford, and has, in addition to the agricultural teaching, departments of letters and science, music and the fine arts, and provides teaching for about 1,000 day and evening students.

The diploma in agriculture requires a two-years course at the College, and one year in practical work on a farm. A shorter course in agriculture is also provided, of six weeks, at the end of which time certificates are awarded to successful students. This is designed for candidates already familiar with farm work.

The College undertakes work in the adjoining counties in connection with field experiments, and lectures at rural centres, and advises with regard to insect pests, plant diseases and the manuring of crops. Field experiments are carried on at several different points in each of the counties represented on the college council, the use of the land required for this purpose being given by prominent farmers. The size of the plots are from one-tenth acre, sometimes less, to one-fourth acre each, and from eight to twelve plots are used in each case. The lines of experimental work carried on have been with manures as top dressings on pasture ; also with crops of turnips and potatoes; rotation experiments, tests of varieties of oats, experiments in sowing lucerne and sanfoin; also with lime as a remedy for the disease known as finger and toe in turnips. In order to give a more permanent character to the experimental work, the Hampshire County Council has recently leased 2½ acres of land at Botley, as a permanent station for field experiments.

VISIT TO CAMBRIDGE.

A visit was also made to Cambridge and a profitable day spent with Prof. Wm. Somerville, Professor of Agriculture in Cambridge University. In addition to the lectures on practical and scientific agriculture given at Cambridge arrangements have recently been made for the establishment of an experimental farm in connection with the University where experiments in agriculture of a permanent character will be conducted. A visit was paid to this farm which consists of about 180 acres, located some eight miles from the town of Cambridge.

About 150 acres of this land are available for experimental work, and 30 acres are in permanent pasture. It is proposed to devote about 60 acres of good even arable soil to experiments with grain and other important farm crops. A sufficient area will also be set aside for horticultural investigations. There are at present about 2½ acres of land on the farm in forest and it is proposed to set aside 6½ acres more for experimental work in tree planting. The land appears to be very suitable for the purpose, is of good quality, well situated and very even in character. At the time of my visit possession of this property had just been acquired. Work will be begun with experimental plots in the spring of 1901.

Prof. Somerville has also the supervision of 40 acres of land in Northampton, which has been rented for a term of years to determine the quality and nutritious properties of the grass grown with different fertilizers ; the experiments being similar to those which Prof. Somerville has heretofore carried on so successfully at Cockle Park. Forty acres are under similar control in Hampshire and a like area in Cambridgeshire. In Norfolk and Essex from 16 to 20 acres are also under this line of experiment.

It was my purpose to visit several other of the more important experimental stations and teaching colleges in England, particularly those at Wye, under the direction of Prof. A. D. Hall, where a number of important lines of work are being conducted ; the Woburn Experimental Farm, under direction of Dr. Voelcker. The Woburn Experimental Fruit Farm, established by the Duke of Bedford, and under the management of Prof. Spencer Pickering. The agricultural and horticultural school at Holmes Chapel, under the Cheshire County Council. The field experiments conducted at Bramford, under a committee of the East Suffolk County Council and the Agricultural College at Cirencester. The limited time, however, at my disposal was not sufficient to permit of the carrying out of these plans.

KEW AND ROTHAMSTED, &c.

A profitable day was spent at the Royal Gardens at Kew inspecting the large number of interesting trees, shrubs and plants growing there, and another day was devoted to Rothamsted.

The recent lamented death of Sir John Lawes had thrown a gloom over Rothamsted and deprived me of the pleasure I had hoped for of renewing the acquaintance formed in 1886 with that venerable experimenter. Sir Henry Gilbert was also absent, but Dr. N. H. Miller, who was in charge, very kindly showed me over the grounds and answered my many inquiries.

The grain harvest was over at the time of my visit, but I saw the plots of roots grown with and without fertilizers, also the grass plots from which a second crop was then being cut. It was a great pleasure to see these experimental grounds once more, and with Dr. Miller's kindly help the visit was made a very instructive one.

Visits were also made while in England to some of the leading nurseries—to Dickson's extensive grounds at Chester, where a large number of most interesting things were seen ; to Sutton's seed warehouses and trial grounds at Reading, to Barr & Sons, the well-known growers of narcissus and paeonies and to Amos Perry's noted establishment for hardy perennials, at Winchmore Hill, near London. At all these places valuable material was secured for experimental tests in Canada.

WALES.

Several days were spent in Wales, this was early in August when the crops were still on the ground. Much of the grain over most of the country travelled was lodged, and the crops seemed light, and the general condition of the farming of the country appeared to be backward. The small black Welsh cattle were common and Welsh sheep very plentiful, but the swine seen were of a very nondescript character.

The objective point in this journey was the Agricultural College at Aberystwith, and the scenery of the country passed through was delightful. On the way many large tree plantations were observed where bare hills had been clothed with a luxuriant growth of European larch, many of the plantations having attained a sufficient size to furnish merchantable timber.

Aberystwith is very prettily situated on the sea shore, and from the college buildings there are fine views of the water.

The teaching carried on in the agricultural department at the college consists of a three years' course for the degree in agriculture, a two years' course for a diploma, and a seven weeks' course for farmer's sons, when, if the prescribed examination is passed, a certificate of proficiency is given.

In dairying several courses of instruction are carried on, a twenty weeks' course, a ten weeks' course, and also one of six weeks. Instruction in dairying is also given at local centres by means of travelling dairies, and courses of lectures on agriculture are also given to farmers in rural centres in the adjoining counties.

About two acres of land convenient to the college are under control of the agricultural staff, and an additional area of 30 acres has been recently secured. One acre is devoted to an experimental orchard, about one half of which has been planted with apples, pears and plums. Half an acre is in use for testing different sorts of vegetables and a quarter of an acre is devoted to experiments with grain, in testing the influence of fertilizers of different sorts on their growth.

An association has been formed there of ex-students, to carry on experiments with fertilizers on their individual farms, and there are now in all about 40 of these co-operative stations.

SCOTLAND.

Glasgow and Edinburgh were the points visited. A few hours were pleasantly occupied in examining the collection of trees, shrubs and plants brought together in the Glasgow Botanic Gardens, and in visiting the buildings in course of construction for the great exhibition to be held there in 1901. The chief object in my visit to Glasgow was to gain some information regarding the West of Scotland Agricultural College.

This useful agricultural institution was established a year ago, under the direction of Prof. R. Patrick Wright. Prior to this it existed as a department of the Glasgow Technical College, and there was a separate dairy school at Kilmarnock. Now the dairy school and a recently acquired experimental farm of 200 acres has been united with the Agricultural College, which will supply the means for permanent experimental work. The dairy school is carried on during the summer months only. The building where the teaching work is done is conveniently situated in a central part of the city of Glasgow, and is provided with all the appliances necessary for effective teaching. Practical agriculture, agricultural chemistry and botany are the leading branches taught.

In connection with this College an extensive system of experimental work has been conducted for the past eight years on about fifty different farms, in the central and southwest counties of Scotland. The experiments are very comprehensive in their character, and are for the most part along the following lines : The effects of farm-yard and artificial manures on hay, grain, roots and potatoes. Investigations regarding the mealing power of oats grown with different fertilizers, the effect of fertilizers on the quality of the hay produced, their influence on the size and quality of potato tubers. Rotation of crops has been the subject of many experiments, and many varietal tests have been conducted with oats. Tests have also been carried on in the feeding of sheep. The more prominent farmers in different parts of Scotland have taken much interest in this work, and are free in offering the use of such limited portions of their land as may be required for carrying on these experiments. No payment is made to the experimenters, but the manures and seed are usually supplied. Each farm where experiments are in progress is visited by a member of the staff, at least once during the season, when lectures are frequently given in the locality, and the results are subsequently published in bulletin form. The College is affiliated with Glasgow University, and students who attend the full course of three years in the college and pass the examinations, obtain the degree of B. Sc. in the University. The dairy sessions are for ten weeks, and include practical work on butter and cheese. Students who succeed in passing the examinations receive certificates at the end of the course.

THE DALMENY EXPERIMENTAL GROUNDS.

These were established and are maintained by Lord Rosebery, in connection with his large estate at Dalmeny, a few miles from Edinburgh. At the time of my visit I was so fortunate as to meet both Mr. Drysdale, Lord Rosebery's factor, and Mr. John Hunter, who has charge of the scientific research work at Dalmeny. These gentlemen courteously showed me through the experimental grounds, and explained the objects in view in the various trials being made. Experiments were in progress with wheat, barley and oats, and with different fertilizers on these crops, also tests regarding the unexhausted value of manures, which had been applied to previous crops for three or four years. On these plots crops were now being grown, and would be grown for several years in succession without manures.

In the experiments conducted at Dalmeny, lime has been found very useful to all sorts of crops, in the form of an annual limited dressing of about 450 pounds per acre.

These experimental grounds, as explained by Mr. Drysdale, had been established by Lord Rosebery for the purpose of finding out the best method of producing the best possible crop, at the least possible cost, and the experience gained by the experimental plots was made good use of on the larger fields on the farm.

MEETING OF THE BRITISH ASSOCIATION.

On leaving Scotland a visit was paid to Bradford, in Yorkshire, where the meeting of the British Association was being held. On an invitation extended by the president of the Section of Economic Science, I prepared the following paper on experimental agriculture in Canada, which was read before the Association.

RESULTS OF EXPERIMENTAL WORK IN AGRICULTURE IN CANADA, UNDER GOVERNMENT ORGANIZATION, BY DR. WM. SAUNDERS, DIRECTOR CANADIAN EXPERIMENTAL FARMS.

There is probably no country in the world where nature has been more liberal in the stores of fertility provided in the soil, or where the land has greater capacity for the production of food for the human race than in Canada. While the resources of the Dominion in its minerals, its forests and its fisheries are great and valuable it is in the soil that the greater wealth of the country lies. The immensity of the area of good and fertile land in Canada is very imperfectly understood even by those who have had the opportunity of visiting the country, and but a very small proportion of the arable land has yet been brought under cultivation.

The climatic conditions in Canada are very dissimilar in different parts, and are not favourable everywhere for the production of the same crops. Very large areas, however, particularly in the great plains of Manitoba and the North-west Territories, are specially adapted for the production of cereals, particularly wheat of the highest quality. In other and more limited districts conditions prevail which render them very suitable for the growing of fruits. Nearly all the arable lands of the Dominion offer advantages for mixed farming, for the growing of different sorts of grain, grasses, roots and other forage plants, and for the raising of cattle, swine, sheep and poultry, and for the production of butter and cheese. More than half of the entire population are engaged in agricultural pursuits, but the population is as yet sparse, and the area of unoccupied land so very large that no adequate conception can be formed as to the vast quantities of food products which Canada could produce were its inhabitants at all proportionate to its resources.

With such conditions it is apparent that the developing and fostering of the agricultural interests of Canada is a subject of pre-eminent importance to all classes of her people, and is one which frequently engages the attention of both the federal and provincial governments.

In 1884, the House of Commons appointed a select committee to inquire into the best means of developing and encouraging the agricultural interests of Canada. This committee made a careful inquiry into the subject, also as to the disadvantages and wants experienced by agriculturists in Canada, taking evidence from various persons, who had made a special study of the different branches of industry included under the general term Agriculture, and of others having a scientific knowledge bearing on this subject. In the report subsequently submitted to the House of Commons, the substance of the evidence accumulated is thus summarized :—

'Notwithstanding the great progress made in recent years, it appears that there is a large amount of defective farming in this country. In the cultivation of cereals, roots and grasses there is want of periodical change of seed, selection of improved varieties, a proper rotation of crops, with a lack of thorough tillage and a knowledge of the value and suitability of manures. The value of manures is, in many cases, unheeded, and much fertilizing power is lost through negligent exposure and the waste of liquid manures. In stock-raising the chief deficiencies are the want of pure-bred males, lack of knowledge of the adaptability of breeds to particular conditions throughout the Dominion, the want of better pasture and more abundant tree shelter. In the production of butter, the milk is frequently not properly cared for, nor is suitable

attention paid to the selection of milch cows, and the food given is often deficient in nutriment and in milk-producing qualities.

'Low grades of butter are attributable to want of skill in its manufacture and want of improved apparatus. In cheese making, the need of greater skill and want of scientific knowledge is also felt. In the cultivation of fruit a great want is experienced in many sections of hardier varieties, and of varieties with improved keeping qualities. There is also a deplorable want of knowledge regarding the insects and diseases injurious to fruit trees.'

This committee also reported that in the replies they had received to a number of questions submitted to many leading farmers in every part of the Dominion, a large proportion advised the establishment of experimental farms, not only a central one, but also branch farms in every province. The protection of farmers against the sale of fraudulent fertilizers was also urged. The committee recommended that the government establish an experimental farm or farms where experiments might be carried on in connection with all branches of agriculture and horticulture, and that the results of the work conducted should be published from time to time and disseminated freely amongst the farmers of the Dominion.

No action was taken by the government on this matter until November, 1885, when, on the accession of the Honourable, now Sir John Carling, to the position of Minister of Agriculture for the Dominion, he instituted measures for the accumulation of further information so that the fullest data might be available, and the experimental farms so much needed established on the most approved plans without further delay. Particulars regarding experimental stations then in operation in Europe and America were obtained and published, and during the session of parliament for 1886, an Act was introduced and passed almost unanimously, authorizing the government to establish a central experimental farm and four branch farms. The principal or central farm was to be located at or near the capital, Ottawa, where it was to serve the purposes of the two larger provinces, Ontario and Quebec The branch farms were to be distributed as follows :—

One for the Maritime provinces jointly, one for Manitoba, one for the North-west Territories and one for British Columbia.

The work which was to be undertaken at these several experimental farms was thus set forth in the Act.

(a.) Conduct researches and verify the experiments designed to test the relative value, for all purposes, of different breeds of stock, and their adaptability to the varying climatic or other conditions which prevail in the several provinces and in the the North-west Territories ;

(b.) Examine into scientific and economic questions involved in the production of butter and cheese ;

(c.) Test the merits, hardiness and adaptability of new or untried varieties of wheat and other cereals, and of all field crops, grasses and forage plants, fruits, vegetables, plants and trees, and disseminate among persons engaged in farming, gardening or fruit-growing, upon such conditions as are prescribed by the Minister of Agriculture, samples of such surplus products as are considered to be specially worthy of introduction ;

(d.) Analyze fertilizers, whether natural or artificial, and conduct experiments with such fertilizers, in order to test their comparative value as applied to crops of different kinds ;

(e.) Examine into the composition and digestibility of foods for domestic animals;

(f.) Conduct experiments in the planting of trees for timber and shelter ;

(g.) Examine into the diseases to which cultivated plants and trees are subject, and also into the ravages of destructive insects and ascertain and test the most useful preventatives and remedies to be used in each case ;

(h.) Investigate the diseases to which domestic animals are subject ;

(i.) Ascertain the vitality and purity of agricultural seeds ; and

(j.) Conduct any other experiments and researches bearing upon the agricultural industry of Canada, which may be approved by the Minister of Agriculture.

In October, 1886, I had the honour of being appointed Director of the experimental farms for Canada, and under Sir John Carling, was intrusted with the work of selecting the necessary sites also in the choice of the officers required to carry on the work of the several institutions. Within two years the land for the several farms was secured, the necessary officers appointed, most of the buildings erected and the farms put in practical operation. The central farm was located near Ottawa, the branch farm for the three eastern provinces at Nappan, Nova Scotia, a central point near the boundary of New Brunswick and fairly convenient to Prince Edward Island. The experimental farm for Manitoba was placed at Brandon, that for the North-west Territories at Indian Head, in Assiniboia, and the farm for British Columbia at Agassiz, in the coast climate of that province.

In the choosing of these sites the purpose in view was to have them so located as to be fairly representative of the larger settled areas in the provinces in which they were placed, while in the arrangement of the work such experiments as would be most likely to be beneficial to the larger number of settlers in each case were among the first to engage the attention of the officers in charge.

Twelve years have passed since this work was inaugurated and during that time agriculture in Canada has made unprecedented advancement. While it is not claimed that this progress has been wholly due to the work and influence of the Dominion Experimental Farms, much credit is justly due to the various measures carried on by the useful organisations established by the several provinces. There is, however, no doubt that the institutions established by the Federal Government have been a most important factor in this connection. The progress referred to has resulted in improving the condition of the agricultural population all over the country, and in a vast increase in the exports of agricultural products.

Investigation and experimental research has been carried on along all the lines of work laid down in the Act which originated these farms and a great mass of important facts have been accumulated in all branches of agriculture, and those sciences which contribute to a thorough knowledge of its governing laws as may be seen in the annual reports presented to the government.

There is probably no employment which engages man's attention, that requires more skill and more general information than farming. Competition is keen throughout the civilized world, and the farmer must turn to practical account every advantage within his reach bearing on the improvement, in the quality of his products and in lessening the cost of their production if he is to maintain and improve his position.

When the experimental farms were planned it was intended that they should become bureaus of information to which farmers could apply from time to time to aid them in the solution of difficulties which frequently present themselves during the progress of farm work. Evidence of their usefulness in this way is furnished in the rapid increase of the correspondence carried on with farmers in all parts of the Dominion. In 1889, the year after the farms had become fairly organised, the number of letters received was about 8,000. During 1899 there were received at the several experimental farms 69,669 letters, of which written replies were sent to 36,590, the remainder were of such a nature as to admit of their being answered by printed circulars. In addition 215,000 reports and bulletins were sent out. There is thus a constant flow of information going to Canadian farmers from all the experimental farms which is producing excellent results.

It is, as a rule, a difficult matter to bring about rapid changes in the ideas and practice of farmers, but as soon as they are convinced that experimental work is carried on in a practical manner by persons competent to give information, that it is

undertaken in their interests and with the special object of making farming more profitable, their sympathy and co-operation is assured.

The subject of experimental agriculture covers much too large a field to permit of its being treated in a comprehensive manner in a single address. I can, therefore, but refer briefly to a few important points in connection with the work which has been done by the Canadian Experimental Farms, such as will indicate the general trend of the work and serve as specimens of the many lines of research undertaken.

The principles which underly successful crop-growing in Canada may be thus summarized :

Maintaining the fertility of the land, mainly by the proper care and use of barn-yard manure and the ploughing under of green clover, thus adding fertility and humus.

Adopting a judicious rotation of crops.

Following the best methods of preparing the land.

Early sowing.

Choosing the best and most productive varieties.

The selection of plump and well-ripened seed.

Along these several lines many experiments have been conducted.

Continued efforts have been made to gain knowledge as to the best methods of maintaining and adding to the fertility of the land. In this connection, special attention has been given to investigations to determine the best methods of handling and using barn-yard manure, the universal fertilizer which is more or less available everywhere to the average Canadian farmer. Experiments continued for eleven years have shown that a given weight of manure taken fresh from the barn yard is equal in crop-producing power to the same weight of rotted manure. It has also been shown by repeated tests that fresh manure loses during the process of rotting from 50 per cent to 60 per cent of its weight. The effective use of barn-yard manure so as to obtain the best results with the least waste is without doubt one of the most important problems connected with successful agriculture, for on this material the farmer's hopes of maintaining the fertility of his land and thus providing for a succession of good crops are mainly based.

During the past eleven years annual tests have been made to gain information on the relative value of artificial manures, used separately and in combination, on nearly all the more important farm crops, and the average results of this work have been published. These continued experiments with artificial fertilizers, used alone, have given results which are disappointing, considering the large proportion of available plant food they contain. One reason for this lies probably in the fact that these fertilizers contain no humus and that the proportion of vegetable matter in the soil has been much reduced by constant cropping. The capacity of the soil for holding moisture has been lessened, to the detriment of its crop-producing power.

Experiments have also been conducted for several years in the ploughing under of green clover to enrich the land, and it has been demonstrated that clover seed can be sown in all the eastern provinces of Canada and in the coast climate of British Columbia to advantage with all cereal crops, without lessening the grain crop for the current year, and that after the grain is cut the clover grows luxuriantly, acting as a catch crop during the latter part of the season. Green clover is specially valuable to the land, for the reason that it absorbs while growing large quantities of nitrogen from the air which is stored up in its tissues. A heavy mat of growth is produced by the autumn, which, when ploughed under, adds considerably to the available nitrogen in the soil as well as to the store of humus. The proportion of nitrogen thus added to the land has been found to be equal to that obtained from a dressing of 10 tons of barn-yard manure to the acre. Considerable supplies of potash, phosphoric acid and lime are also taken up by the clover plant during its growth, a part of which is gathered from depths in the soil not reached by some other farm crops. In this way the clover is practically an enricher of the soil to some extent in these other important elements.

That the land has been much improved by this treatment has been shown in increased crops on many plots, when compared with adjoining plots on which no clover had been sown. With the oat crop in one series of experiments, the average increase for the first year was 28 per cent in the weight of the grain produced and 78 per cent in the weight of the straw. In the second year, when barley was sown on the same series of plots without any additional fertilizer, the increase in the weight of grain produced on the plots which had been treated with clover was 29 per cent, and the increase in the weight of straw, 35 per cent. In a similar course of experiments conducted with potatoes, the plots treated with clover gave an average increase in the weight of the tubers of 28 per cent.

In preparing the land for crop different methods are adopted in different parts of the Dominion. In the eastern provinces the advantages arising from fall ploughing have been repeatedly shown. The exposure of the soil to the influence of frost, sunlight and air is beneficial, and spring work is materially advanced, and crops can be got in earlier by the general adoption of this practice. On the North-west plains it has been found of great advantage to 'summer fallow' a part of the land each year. This practice conserves moisture, destroys weeds and brings the farmer much larger crops. The yield of wheat on land which has been summer-fallowed will average fully one-third more than on land which has been prepared by fall or spring ploughing.

That increased crops result from early sowing has been fully demonstrated by the tests carried on at the experimental farms These experiments with early, medium and late sowings have been conducted for ten years on plots of one-tenth acre each on land very uniform in character. The same preparation has been given to the soil in each case and the same lots of seeds have been used for each sowing. Forty-eight plots have been devoted to this experiment, eight of which have been sown at the very earliest time practicable with two varieties each of wheat, oats, barley and pease. A second series has been sown at the end of a week, and others at the end of each subsequent week, until six successive sowings have been made. These plots have all been harvested and threshed separately and the result published each year. The best crops have been had from the second sowings, made just one week after it was possible to sow the seed; beyond this, delay in sowing has resulted in loss, which has become more serious as the delay has been greater. The average of the ten years' experiments shows as follows :—

With wheat a delay of one week beyond the period named has entailed a loss of over 30 per cent ; two weeks, 40 per cent ; three weeks, nearly 50 per cent, and four weeks, 56 per cent of the crop.

With oats a delay of one week has caused an average loss of over 15 per cent ; two weeks, 22 per cent ; three weeks, over 32 per cent, and four weeks, about 48 per cent.

In the case of barley a delay of one week has resulted in an average loss of 23 per cent ; two weeks, 27 per cent ; three weeks, 40 per cent, and four weeks, nearly 46 per cent.

With pease the loss in crop from delay has been less. A delay of one week has lessened the crop to the extent of 4 per cent ; two weeks, 12 per cent ; three weeks, 22 per cent, and four weeks, 30 per cent.

The results of these experiments have led farmers generally to pay more attention than formerly to early sowing, and in this way crops have been improved.

Another important consideration in connection with successful farming is the selection of the best varieties of seed for sowing, taking into consideration productiveness, quality and earliness of maturing. That there are varieties more productive and earlier in ripening than other sorts has been abundantly proven.

During a five years' test of 41 varieties of oats, all of them sown each year on the same day, and on similar soil, the results have demonstrated the relative productiveness of certain sorts. Each year a list has been published of the best twelve in the series, and during the whole period of five years only fifteen varieties have found their

way into this select list, and nine of the varieties under test have appeared among the best twelve every year.

Similar evidence has been furnished with spring wheat, thirty-one varieties of which have been under trial for a like period. In this instance sixteen of the thirty-one sorts have appeared among the best twelve during the five years' trial, and nine of the varieties have appeared each year in that list. In the case of barley the evidence furnished in this direction is still more striking.

In spring wheat the difference in yield between the different sorts under uniform conditions as to treatment has ranged from 31 to 16 bushels per acre. Oats from 89 bushels to 42 bushels, barley from 58 to 33 bushels, and pease from 46 bushels to 20 bushels per acre. The importance of taking advantage of this variation in yield, and of encouraging the growth of the more prolific sorts becomes more apparent when we consider the large area under cultivation. As an example, the addition of a single bushel of oats to the average crop of Canada adds to the profits of the Canadian farmers more than £200,000 or one million dollars.

After careful and continued experiments have shown that any variety is specially promising, such variety is cultivated on a larger scale, so as to admit of its free distribution among the farmers of the Dominion. This grain is grown on the experimental farms, and is distributed chiefly from the central farm at Ottawa, forwarded in small bags through the mail. The samples are sent on personal application only from 3 to 10 pounds being forwarded to each farmer. Only one variety is obtainable by an applicant each year, and with this restriction, the quantity sent from the central farm every year for the past three years has averaged over 60 tons. The applications received each season have averaged more than 30,000. Those farmers who take good care of the samples received usually have at the end of the second season sufficient seed for a considerable acreage, and henceforward have all they require for their own seed and some surplus to sell to their less careful neighbours. By this method these better varieties of grain are soon spread all over the country, and the average yield of the more important crops is thus increased.

In this way the farmer is directly benefited, and with the help of the reports and bulletins published by the experimental farms, he is kept informed of the general work in progress, and is brought into sympathy with it.

Many varieties of grain have been brought to Canada for test from nearly all the grain growing countries of the world. New sorts of wheat, barley, oats and pease have also been produced at the experimental farms by cross-fertilizing with the object of combining the good qualities of varieties, more especially with a view of obtaining increased vigour, greater productiveness, and an early maturing habit. During the past ten years more than seven hundred new sorts have thus been produced and tested, and among these there are quite a number of promising varieties. Experiments have also been conducted for a series of years to ascertain the quantity of seed grain most profitable to sow per acre, the depth in the soil at which it is most advantageous to place the seed in the different climates in the Dominion, and the relative advantages of sowing broadcast and with different sorts of drills.

The object lessons which have been given in the raising of fodder crops and the converting of these into ensilage, thus providing succulent food for cattle, have greatly stimulated the dairy industry, especially the manufacture of butter in winter ; also the fattening of steers, thus affording profitable employment for farm labour during the winter months. The experiments which have been conducted with reference to the economical production of butter of the highest quality, and the best management of milk to secure the most complete separation of the butter fat, have commanded much attention from those engaged in this special industry. The experience gained by the feeding of cattle, sheep and swine, and in the testing of those breeds especially adapted to produce the highest quality of beef, mutton and pork, has stimulated and aided the stock industries. The business in eggs and dressed fowls for the table, has also been advanced by the publication of results obtained from experiments conducted in the poultry branch.

The instructive experiments which have been carried on with many varieties of large and small fruits have served to show where these can be grown to the greatest advantage, and has been helpful in promoting fruit-growing over those large areas where the climate is so well adapted to the growth of fruits of high quality. By cross-fertilization on hardy wild forms new and improved sorts have been produced, some of which will, it is believed, be hardy enough to succeed in all those portions of the country where the climate is less favourable to fruit-growing. The information which has been given on the cultivation of vegetables and the varieties best suited to the different climates of the country has also proved of much value.

Experiments in tree planting were begun at all the experimental farms as soon as practicable after their organization. At the central farm twenty acres are devoted to forest experiments to determine the relative growth of the more important timber trees under different conditions. Sixty acres of the same farm are in use as an Arboretum where trees and shrubs from many countries are under test to detrmine how far they are suitable for growth in eastern Canada. Smaller areas are being devoted to the same purpose on the branch experimental farms. As the need for forest shelter is very great on the open plains in the North-west country special attention has been given to the encouraging of tree planting for shelter in Manitoba and the North-west Territories. About sixty to seventy thousand trees have been planted on each of the western experimental farms in shelter belts, shelter blocks, avenues and hedges, furnishing examples as to the best methods of planting and giving information as to the cost of planting per acre. To aid others in starting this useful work there has been distributed free through the mail, on application during the past twelve years, 1,261,000 young forest trees in lots of about 100 each, and more than 7 tons of tree seeds have been sent to settlers in sample bags of one pound each, every package containing sufficient to produce with reasonable care from 500 to 800 young seedlings. The results of this work are now everywhere apparent. On homesteads in almost every part of the North-west plains, there are small plantations of forest trees which afford shelter for buildings and stock; also for the growing of garden vegetables, small fruits and flowers, and at the same time make the dwellings of the settlers more attractive by converting bare and uninviting surroundings into pleasant ad sheltered homes.

The practical help which has been rendered by the officers who have charge of the more scientific part of the work has also been a source of satisfaction to the public. The information given by my colleague, Dr. James Fletcher, as to the best remedies for the destruction of noxious insects and for resisting the inroads made by fungus diseases from which grain, fruit and other crops have suffered has been much appreciated, and the good results obtained from the use of the measures recommended have been very satisfactory to farmers and fruit-growers. The subject of noxious weeds has also been fully investigated and the best measures pointed out for their subjugation.

In the chemical division, under the charge of Mr. F. T. Shutt, investigations have been conducted to determine the nutritious constituents in many fodder plants which have been analysed at different stages in their growth to ascertain the period when these plants may be cut to the greatest advantage. The farmers of Canada have profited much from this valuable information. In many other lines of chemical research bearing on agriculture much useful information has been given regarding the care of and the action of manures, the usefulness of mucks, muds and marls as fertilizing agents, on the composition of soils in different parts of the Dominion and on many kindred subjects.

Much information is given each year by the agriculturist, the horticulturist, the poultry manager and other officers of the central farm. Also by the superintendents and other officers of the branch farms who attend meetings of farmers held in all parts of the country where opportunities are afforded of giving fuller explanations concerning all branches of the work in progress at the several experimental farms.

In the meantime the occupation of farming has been elevated in the eyes of the community. It is no longer looked upon as a drudgery suited only to the dull and slow going. It is now regarded as a suitable field for the exercise of the higher intelligence of more cultivated minds, and is recognised as a calling requiring much skill to conduct it successfully.

A few figures will illustrate the progress made along some of the lines referred to. The exports of wheat and flour have assumed large proportions. In 1884 the value of the cheese export from Canada was £1,450,397 ; in 1898 it was £3,512,553. During the same period the value of the butter exported has nearly doubled. The exports of cattle have also increased considerably. The trade in pork has made a phenomenal growth. In 1884 the value of the exports of hams, bacon, pork and lard was less than £200,000; in 1898 it amounted to more than £1,600,000. The increase in the exports of many other agricultural products have also been most encouraging.

DISCUSSION FOLLOWING ADDRESS.

An interesting discussion followed the reading of this paper from which some extracts are given.

'Professor Somerville (Professor of Agriculture at Cambridge) thought they were greatly indebted to Dr. Saunders for an interesting and exhaustive paper, which had come at an extremely opportune time. Many persons in this country had for the past few years been endeavouring to formulate a suitable scheme for the improvement on scientific lines of agriculture in England, Scotland and Ireland, and those who were engaged in this work had kept their eye carefully on what was being done on the other side of the Atlantic—in the United States as well as in Canada. As the head of the experimental work in Canada, Dr. Saunders had given to the world, in his annual report, yearly a volume that described exhaustively the experimental work of the Dominion, and they in England had derived great benefit from the perusal of this work. Canada had begun her experimental work on thorough and complete governmental lines, and at first it did not seem as if it would lead to very satisfactory results, for experiment by Act of Parliament looked to be a very cast-iron mode of procedure, but practically the experiment had resulted in an entirely free hand being given to those appointed to carry on the work, with very excellent results. In this country the work had been suported by the government to some extent, and it had greatly benefited from that support. The great difference, however, between Canada and this country was that here they looked more largely to local effort. Practically there was no experimental or educational work of an agricultural character in this country entirely maintained from government sources. One of the conditions under which government support was given was that the localities themselves where the work was carried on showed sufficient interest in the work to warrant the government in giving substantial support. They knew how difficult it was to excite local interest, especially in an agricultural community, in work of that kind, but if they could get local farmers upon the committees, they would bring them into closer contact with the work, and valuable information would be disseminated throughout the district. Though the work in this country had only been systematised since 1890, a great deal of experimental work had been done as far back as the end of the last century. Individual workers had carried out an enormous number of experiments in the last quarter of the last century, which had been described in a number of volumes. Then, the old Board of Agriculture came into existence in 1792 and expired in 1819, and the presidents of that Board had always strongly insisted on the value of experimental farms as an aid to agriculture. But between the early years of the present century and the year 1890 very little experimental work had been done with government support. In 1890, however, they had started on a new era, and the amount of work

put in during the last ten years had been fairly satisfactory. They had yet much to learn as regarded the best lines of procedure, but they were now fairly well settled down to steady work. The line they were following was to have a central establishment with institutions distributed throughout the country.

EXPERIMENTAL WORK IN ENGLAND.

'At present in England there were eight or nine institutions that received government support in the shape of annual grants. These grants, supplemented by local support, were sufficient to provide a staff of instructors and also facilities for the conduct of experiments. The educational work was carried on on orthodox lines, and the experimental work was devised and carried out on the initiative of the workers at the various centres. The results achieved during the last few years had been very extensive and had led to a belief, on the part of the farmers themselves, that the work was of distinct value to agriculture. But the value of the work was not so much in the way of placing models and examples, as it were, before the farmers as in making the farmers think in a way they had not thought in the past. Agriculturists, if they were not stirred up in some way, were apt to go along on lines that they had followed in the past. In many cases these lines were satisfactory, but also in many cases it was likely that improvements would be effective. When the farmers saw that these improvements led to better results, they began to devote more intelligence to their business. He considered that the work done in Canada was extremely valuable to farmers in this country, and he believed great advantage would be derived from the improvements in the varieties of cereals and other plants. In the United States, also, especially in Wisconsin, valuable work had been done in the direction of improving the yield of cereals, not by extending the area planted, or by better manuring and tillage, but entirely by introducing new varieties of seeds. The improved yield from new varieties was often perfectly astonishing, and that without any increased expenditure on labour or manure. With regard to the advantages Dr. Saunders found could be derived from growing clover along with cereals, that was a point that had strongly been insisted upon by Humphrey Davy in the first decade of the present century, but he (the speaker) did not think the practice would be of value in this country, for the simple reason that the best farmers here hoed their wheat, and of course it was impossible to hoe the wheat if the clover plants were sown along with it. He did not propose to make any attempt to criticise Dr. Saunders's paper, which deserved the most careful consideration, and would no doubt prove of very great value to English agriculturists.

'CANADIAN FARMS.

'Professor A. D. Hall (Principal of the South-Eastern Agricultural College, Wye) said that after Dr. Saunder's description of the work of the Canadian experimental farms, the feeling of agriculturists in this country must be one of envy. In Canada they saw a great scheme started in a great way by the government. They put the whole thing in the hands of competent experts, and they found a great scheme started in all its details suited to meet the wants of the country. Such a scheme was bound to succeed. He could not help comparing that with the haphazard, casual way in which things had been done in this country. It was not that the English landowner and farmer were not interested in experimental work, or had not initiated such work, because some of the very best experimental work had been done for years in this country by individuals and voluntary societies, but, as he had said, the work was of a casual, haphazard kind. Very good work had undoubtedly been done by the Royal Agricultural Society, and the establishment of the magnificent experimental institu-

tion at Rothamsted was entirely due to private initiative. By these means a good start was made, and a further impetus was given to the work ten years ago, but the fact that the work was scattered about, was under the control of various authorities, and was partly voluntary, while important vested interests had sprung up in connection with it, had prevented the State from stepping in and elaborating a scheme that would completely cover the whole ground. He could not agree with Professor Somerville that there was any great amount of good work being done. They were still experimentalising, but outside Rothamsted there was very little of pure research going on in this country. It was possible only by governmental initiative, with the weight of a great department to carry on the work, to create and continue a real research station, which could work, as it were, in the dark for a long period before they could expect to bring about good results. There was another point in which it struck him Canada had secured a great advantage: they had disassociated the teaching side from the experimental side. In this country we were making the mistake of supposing that the two things of teaching and experimenting should be in the same hands. It seemed to him to be impossible to have an educational and a research station together unless there were absolutely separate staffs. The teacher conducted his operations from an educational point of view, and having due regard to the interests of his pupils, but this attention to the needs of the pupils prevented research being properly and thoroughly carried on. If they wanted an experimental station of the best type, they must have a separate staff, giving up the whole of their time to the work. Dr. Saunders's paper would help to clear up their ideas on the subject. Local authorities in this country who largely controlled the work, very much wanted to have clearer ideas as to what was required. At present the work was chiefly educational, and mostly consisted of demonstrations to the farmers of such improved methods as were generally known, and there was little of real experimental work, such as was done at Rothamsted. Until we were able to separate these three departments of the work—the educational, the demonstrative, and the experimental—from each other, they would not make much progress.

'The President, in closing the discussion, said that of course the circumstances of one country differed enormously from those of another country with regard to the methods by which experimental work could be initiated and carried on, and no doubt in a new country where the occupants of the land were scattered far apart, with little individual co-operation, the influence of a central power was essential to the starting of experimental work. As Professor Somerville had explained, it was not the practice in this country to begin work of that kind with State help, but for the State to come in and supplement the work of individuals and voluntary societies. But it should be remembered that the State had lately taken a very long step in the direction of enabling the local authorities to carry on work of this kind—not wholly research work, it was true, but work of a demonstrative character, giving the farmers an object lesson as to what could be done, and what the individual experimenters had worked out in the past. After all, when the State diverted large funds to the assistance of the County Councils to enable them to carry out technical education in all its branches, an important step was taken to place in the hands of the local authorities the power to carry on this experimental agricultural work. There were many points in Dr. Saunders's paper which contained suggestions that were of great value to agriculturists in this country, and they were certainly greatly indebted to the author of the paper for the great amount of time and labour that he had devoted to its preparation.'

VISIT TO FRANCE.

At the close of the meeting of the British Association I went to Paris. I was very favourably impressed with the Canadian exhibits, and particularly so with the agricultural and horticultural collections which I had the responsibility of bringing together.

The exhibits of grain, both in straw and cleaned, were very fine, and attracted deserved attention. The brightness of the straw and the plumpness of the grain spoke volumes for the climates of this country, and the taste with which these and other agricultural products had been displayed excited general admiration.

CANADIAN EXHIBITS OF GRAIN AND FRUITS AT THE PARIS EXHIBITION.

This collection owed much to the experimental farms. From the branch farms at Brandon and Indian Head many of the most attractive sheaves of grain in the straw, and some of the brightest samples of grain, had been sent. Good specimens had also come from Agassiz, B.C., and from Nappan, N.S., with a large quota from the Central Farm. All the officers in charge had used their best efforts towards success, and the results were good, and much credit is due to Mr. W. H. Hay, the accountant of the farm, for the tasteful manner in which he placed the material, and the skill used in disposing of it to the best advantage.

The agricultural exhibits were not, however, by any means confined to the material from the experimental farms. Good exhibits were prepared by most of the provinces ; a large number of farmers also contributed to this work from all parts of the Dominion.

The exhibits of fruit were also a great success. Some 1,200 glass jars, filled with beautiful specimens of our more perishable fruits, reached their destination safely. The largest contribution in this section was from Ontario, and the collection gathered from the fruit-growing districts in this province was put up chiefly at Guelph, under the direction of the Horticulturist, Professor Hutt. The Horticulturist of the Central Experimental Farm, Mr. W. T. Macoun, prepared a fine exhibit of the more perishable fruits grown here, and Mr. R. B. Whyte contributed some of the finest specimens from his large garden in Ottawa.

In Nova Scotia collections were made in the Annapolis Valley and by the Horticulturist at the Experimental Farm at Nappan ; some specimens of fruit for preserving also came from Prince Edward Island. Quebec was well represented in her more perishable fruits, both from the eastern and western sections of the province, and many fine samples were sent from British Columbia by Mr. Thomas A. Sharpe, Superintendent of the Experimental Farm at Agassiz. Many of these had been grown on that farm, and some were produced on the farms of other growers in the Fraser River valley.

Large quantities of fresh fruits of late-keeping sorts were forwarded from the fruit-growing districts in Ontario, Quebec, Nova Scotia, British Columbia, New Brunswick and Prince Edward Island, and put in cold storage, and from these supplies, well preserved and handsome specimens of nearly all of our best varieties of winter apples of the growth of 1899 were available for display until the close of the exposition in November, 1900. Early in October a large supply of fresh fruits were received—the growth of 1900. These were followed by further shipments, including many varieties of excellent apples, pears and peaches. These added very much to the attractiveness of the exhibit and kept up the general interest in it to the end. In plate 2 a view is given of a part of this display. Such continued success has never before attended any exhibit of fruit, and the number of awards received from the international jury is a gratifying evidence of the appreciation in which these exhibits were held.

THE POMOLOGICAL CONGRESS.

At this important gathering, held in Paris from September 12 to 14, Canada was represented by Mr. A. Dupuis, Secretary of the Canadian Commission for Paris, and the writer. We were both honoured by being invited to the platform and introduced

to the large assembly as Canadian representatives. There was a large and distinguished gathering, including eminent pomologists from nearly all the civilized countries in the world. Many interesting papers were presented, which were followed by animated discussions. Among the subjects discussed were the planting of fruit and forest trees on the roadside, which brought out much difference of opinion; the weight of evidence, however, was in favour of using fruit trees for this purpose. The replanting of orchards, the trenching of land, the use of fertilizers on fruit trees, the cultivation of the banana in the French colonies, and the teaching of agriculture and horticulture in the public schools were all discussed. This latter subject called out much difference of opinion. The results of this teaching were commented on favourably by some, while other speakers were of opinion that the progress made by the pupils had not, on the whole, been satisfactory, and it was only where the teachers themselves took a great interest in the subject and imbued the pupils with some of their enthusiasm that much real progress was made, and that the number of teachers so interested was comparatively small.

A paper was presented by Mr. A. Dupuis on 'Horticulture in Canada,' which was very well received. The proceedings of the congress lasted nearly three days, and was well attended throughout.

I also attended the Congress of Botanists, where Canada had three representatives : Mr. James M. Macoun, Assistant Naturalist of the Geological Survey ; Mr. Robert Hamilton, of Grenville, Quebec, and myself.

AGRICULTURAL COLLEGE AT GRIGNON.

A visit was paid to this excellent and well-known National Agricultural School, in company with Dr. Jas. Mills, President of the Ontario College of Agriculture at Guelph, and others. The college at Grignon has commodious buildings and is thoroughly equipped for teaching purposes. It is well supplied with apparatus and material suitable for chemical and physical demonstrations and for the teaching of agriculture and botany. Good examples were also seen of animals belonging to different breeds of stock.

After inspecting the buildings, we visited the fields where experimental work was in progress, and found everything nicely arranged. The series of experiments were well planned and instructive, all calculated to serve an excellent purpose in the instruction of the students. Experiments are conducted with many different sorts of wheat, barley and oats, but the grain plots were all harvested. Samples, however, were shown us in the building, both in straw and cleaned grain. Rotation plots are carried on. Comparative tests were in progress as to the relative value of farm manure and lupins and vetches, ploughed under. Other experiments were also being made with fertilizers. About 230 acres of land, in all, are used for the purposes of this college. The number of pupils in 1900 was 220, 100 of which are boarders; the others live outside the college. About 25 per cent of the pupils are farmers' sons. Fifty varieties of sugar beets were under test in plots of about 8 by 10 feet. Experiments were also in progress with potatoes, using for seed a medium-sized whole potato, as against the half of a large-sized potato. No reports or bulletins are published. Farmers generally are not encouraged to visit this school. The school is established especially for students and for the advancement of scientific work in connection with agriculture, but no means seem to be adopted to make farmers acquainted with the particulars of the work in progress.

VISIT TO NORMANDY.

A journey was made into Normandy to the district of Calvados to inspect one of the large tree-growing establishments for which this district is celebrated. The firm whose place I visited work about 100 acres in all, and grow young trees and shrubs by

the million. About 110 men are employed, and the wages paid are from 50 to 80 cents a day. The larger number of hands receive the lower wage, the more skilled workers 60 cents, and a very few only of the men most skilled in grafting, budding and propagating receive 80 cents per day. The hours for work in the nursery firms in that district, of which there are a large number, are as follows:—From April 1 to October 1, from 5 a.m. to 7 p.m., with 2 hours in all off during the day for meals. From October 1 to November 1 the hours are from 5.30 a.m. to 6.30 p.m., and from November 1 to April 1 they range from 6.30 a.m. to 6 p.m. Some women are also employed in weeding the beds of young trees and nursery stock, which are about 6 feet wide and 50 to 100 feet or more in length, with narrow paths between them. This weeding is all done by hand, the only tools I saw used were the fingers, and the workers receive 30 cents per day; they begin to work at 8 a.m., but the hours for closing are the same as those for the men. The general wages paid to labourers by farmers in this district is 30 cents per day and board. The hours of work in summer are from 4 a.m. to 8 p.m., with two hours rest at noon. The board is very plain, and consists mainly of bread and soup three times a day, with a more or less liberal portion of Normandy cider. There are no holidays or saints days kept by the labouring people in Normandy, and they are only paid for the days they actually work. When employed by the year they occasionally get a day off, but this is a rare thing, and when employed in this way they are expected to do such work as is needed on Sundays, such as the watering of seed beds, &c.

The people look robust and very healthy, and seem quite contented. With such low wages, long hours for labour and an admirable climate for propagating, it is not surprising that young trees and shrubs can be bought in this district at very low prices.

Where men have served the same employer for 25 to 40 years, their cases are reported to the government by the municipal officers, when the government gives medals, which are much prized by those receiving them. The foreman at the nursery visited has been employed by the firm for 26 years, and the secretary for 25 years, and both of these employees had recently received medals.

AT THE VILMORINS AT VERRIERES.

A delightful day was spent at the home of the Vilmorins at Verrieres, a few miles from Paris, in company with Mr. Philippe de Vilmorin, the accomplished son of the late Henry Vilmorin, well known throughout the civilized world for his researches in agriculture and horticulture.

Many magnificent trees are growing about the home, especially cedars of Lebanon, which were decorated with their handsome bright cones. Some rare pines and spruces were seen, now grown to be large trees, the seed of which was planted by the grandfather or great grandfather of Mr. Philippe. A very interesting hybrid was seen, a cross between *Abies cephalonica* and *A. pinsapo*, intermediate in form between these two species. There were also hybrid walnuts, and many other interesting cross-bred trees.

The grain on the experimental plots had all been harvested. The plots were small, but very numerous, each of which contains from 40 to 50 plants of the variety under trial, with sufficient space between them to permit of strong growth. At harvest time two of the best and most productive of the plants are selected for seed and the remainder discarded. No attempt is made to cultivate any of the varieties on trial on a large scale until such variety has shown itself to be of special promise.

The plots during 1900 numbered about 2,500. Of these 1,000 were wheat, 900 of which are named varieties of winter wheat, including about 250 hybrids. There were also 150 varieties of spring wheat, about 100 varieties of barley and nearly 150 different sorts of oats. A few varieties only of each class are grown on a larger scale for commercial purposes.

In shrubs and flowers there were many interesting things. Among the flowers were magnificent beds of Japanese anemones and of the European cyclamen, both in full bloom. Much use was made of some of the free flowering begonias, the large beds of which were very fine and full of bloom. One of the most striking of these was *Begonia gracilis semperflorens*, of which there are rose-coloured and white varieties and one red strain called *Vernon.*

One of the most attractive flower beds seen was one of the original form of the China aster, as found growing wild in China. This is a single flower with bright blue petals and a large yellow centre, and is a most profuse bloomer. It seems singular that after florists have worked on this flower so much during the past half century, and have produced so many varied and beautiful forms, that the original type so long neglected should come back to us now as a first-class novelty.

The time was all too short to permit of more than a passing glance at a part of the wonderful variety of economic and interesting botanical products with which this charming place abounds.

AT BARON ALPHONSE ROTHSCHILDS.

On invitation from Col. G. B. Brackett, in charge of the fruit exhibit of the United States, a day was delightfully spent with him and others in inspecting the estate of Baron Rothschilds at Ferrieres, 20 miles from Paris. The estate covers an area of 6 by 20 miles, the greater part of which is used as a large game preserve, where deer and other animals are abundant, and where game birds are seen at every turn. Twelve hundred acres of this area is maintained in the most perfect manner as a park, where a vast number of species and varieties of trees and shrubs find a home. The great masses of Rhododendrons, Laurels, Yews, Aucubas, Hollies, Box and other comparatively tender things, all in the highest condition of health and vigour, demonstrated the highly favourable character of the climate of that district. The most striking feature about this beautiful park is the perfection in which everything is kept ; among the many thousands of trees and shrubs no unsightly forms are met with, and no evidence of sickliness, partial defoliation or neglect, but every specimen retains the original grace and beauty with which it has been endowed by nature, and every object is so placed as to give it sufficient room to grow without crowding. The wealth of varieties was wonderful. The unusual care shown in every particular was evident from the fact that the little lakes and ponds, in which wild water-birds of many sorts disported, had their surface skimmed several times a day by men in boats, to remove fallen leaves which at that time were dropping freely from the overhanging trees. The displays of tropical plants and the massive flowers beds about the palace-like mansion were very effective.

About 400 men were employed on these grounds, which furnished help sufficient to keep every department in good order. There was a very good aviary, with several buildings specially constructed to suit the habits of the hundreds of different sorts of birds kept there. The fruit garden was a perfect paradise; forty men were employed in it. There were wonderful collections of pears, peaches, nectarines and apples, most of them in full fruit. Many of the trees were trained against walls, but a very large number were grown as cordons, espaliers and pyramids, and nowhere could a misshapen branch or an unnecessary twig be seen, but every specimen was trained on the most approved principles, and the trees were laden with fruit.

The vegetable garden, which employed 25 men, covered a considerable area, furnishing ample room for the growing of all sorts of vegetables in the open air, while hot-beds and green-houses were available for the growth of such as were too tender to stand outside exposure, and for the growing of vegetables out of season.

There were splendid green-houses for orchids, roses, ferns, carnations, palms and other plants requiring special temperatures and treatment, where every species was grown under the most favourable conditions, and other houses provided where the less

tender material was produced in abundance, for outside decoration. It had never been my good fortune before to see grounds so superbly planted, and so remarkably well kept, and the few hours spent there were most delightfully instructive, and produced impressions which will never be effaced from memory.

JOURNEY TO ST. NAZAIRE AND BAULE.

A journey was made to the sea coast of Brittany in company with Col. F. F. Gourdeau, Deputy Minister of Marine and Fisheries, to see the results of the planting of pine forests there on the drifting sands along the ocean shore. The object of the visit was to gain information as to the probable usefulness of such planting if undertaken in Canada on similar areas where moving sands are encroaching on arable land.

Our route lay through the large sea port St. Nazaire to Baule, a thriving town built on the margin of a beautiful beach which extends in the form of a deep crescent for five or six miles. The water is shallow for a long distance out and the beach is a hard smooth sand. The whole district about here has been planted with pines where formerly it was bare and barren, and a mass of drifting sand. The plantations extend for many miles. The trees are almost all of one species Pinus maritima (=*P. pinaster*) known as the cluster pine. This is a small growing pine with large long leaves and very large cones. The trees in this district seemed to be from twenty to fifty years old or more. Their height was from 15 to 25 feet, and the diameter of some of the larger specimens, 3 feet from the ground, was about 12 inches.

M. Berthot is said to have been the planter of these pines ; the work was begun about sixty years ago and it is reported that this gentleman's family have become wealthy owing to the increase in value of the planted land.

In planting, the trees have been set out in groups of six to ten or more and placed about 2 to 3 feet apart each way, with wider spaces of 6 to 12 feet between the groups. The planting and grouping has been done irregularly, but has been so arranged as to thoroughly break the force of wind. From the bent and gnarled condition of some of these trees at outlying points it is obvious that the winds have great force here.

The planting has been entirely successful ; the drifting of the sand has long since ceased and a soil is gradually but slowly forming, mainly through the decay of successive crops of the needle-like leaves of the pines.

THE MUSHROOM CAVES.

Some hours were spent in the mushroom caves which run under parts of Paris. The entrance to these caves is outside the Orleans gate. These excavations which have been made to obtain building stone for the city are very extensive. The stone is found in layers from 30 to 50 feet below the surface, and the quarries have been worked for ages. The mushroom beds are built up about 2 feet high, 18 or 20 inches wide and rounded off at the top, with narrow paths between them. Earth mixed with stable manure is used in their construction. When the heat of the fermenting material is reduced to the most favourable temperature pieces of mushroom spawn are introduced at stated distances all through the beds, and in the course of two or three weeks mushrooms begin to appear all along the tops and sides of the beds, and are produced in quantities from day to day.

There are about 150 growers engaged in this work and several of the larger operators produce as much as 2,000 pounds of mushrooms per day. After a time the beds become exhausted when the material is carted away and fresh beds made in their place. This industry is a very interesting one, and with the requisite experience and skill seems to be a profitable undertaking.

Plate 2.—Part of Exhibit of Canadian Fruit at the Paris Exposition.

AGRICULTURAL DISPLAYS AT THE EXPOSITION.

At intervals while in Paris, when not occupied by official duties, time was found to examine carefully most of the agricultural exhibits at the exposition. Objects of interest were noted and many new varieties of cereals and other farm crops from different countries were secured for experimental test in Canada.

CORRESPONDENCE.

The following is a summary of the letters received and sent out at the Central Experimental Farm, from November 30, 1899, to November 30, 1900. Also the number of reports, bulletins and circulars forwarded by mail during the same period :—

	Letters received.	Letters sent.
Director	42,239	18,495
Agriculturist	1,476	2,127
Horticulturist	1,185	1,332
Chemist	1,026	1,453
Entomologist and Botanist	3,017	2,847
Poultry manager	1,590	870
Accountant	1,001	1,431
Totals	51,534	28,555

A large number of the letters received by the Director are applications for the publications of the farms or for samples of grain. A large proportion of these are answered by sending what is asked for. This will explain why the number received so much exceeds the number answered.

Circular letters sent, including circulars sent with samples of seed grain	39,183
Number of reports and bulletins mailed	194,073

ACKNOWLEDGMENTS.

Grateful acknowledgments are due to the director of the Royal Gardens, Kew, England, for another useful and interesting collection of the seeds of shrubs, trees and plants from northern countries. Also to the director of the Arnold Arboretum, for seeds of some rare and promising trees and shrubs. To the Department of Agriculture at Washington, U.S.A., I am indebted for many different sorts of seeds, especially cereals and vegetables ; also to Prof. John Macoun, naturalist of the Geological and Natural History Survey, and to Mr. J. M. Macoun, my thanks are due for seeds of interesting native species, collected in different parts of Canada.

I beg also to acknowledge the faithful service rendered by all the officers of the central and branch experimental farms, and for their earnest co-operation in carrying out the many lines of experimental work planned.

Hearty thanks are also due to those members of the staff at Ottawa who have rendered me efficient help in those branches of the work in progress there of which I have had personal charge. To the horticulturist, Mr. W. T. Macoun, who has supervised the labour given to the lawns, and to the trees and shrubs planted on the ornamental grounds ; to the farm foreman, Mr. John Fixter, who has carefully watched over the different branches of the work, taken special charge of the fertilized plots and the larger field plots on the experimental grounds, and has aided me much by his practical suggestions and accurate notes ; to Mr. Harry Fixter, who has managed the work connected with the experimental plots of cereals, fodder plots and field roots, and has taken records of the growth and yield of all the varieties grown in the uniform trial plots. I am also indebted to him for the careful management of the many details connected with the distribution of samples of seed grain and potatoes ; to Mr. Wm. Ellis my sincere thanks are rendered for his careful work in testing the vitality of seeds, in the management of the green-house plants, in the propagation of the many useful and ornamental species, and in the taking of the meteorological records. In every branch of work the employees of all the farms have faithfully discharged their duties.

WM. SAUNDERS,

Director Experimental Farms.

REPORT OF THE AGRICULTURIST.

(J. H. GRISDALE, B. Agr.)

Dr. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith reports on Horses, Dairy Cattle, Beef Production, Pork Production, Sheep, and Farm Crops.

During the year, I have attended a number of meetings in Ontario, Quebec, Nova Scotia, New Brunswick, Prince Edward Island and Manitoba.

I am indebted to Mr. John Fixter, farm foreman, and Mr. C. T. Brettell, herdsman, for assistance in the work carried on as well as for help in the preparation of the submitted report.

I have the honour to be, sir,
Your obedient servant,
J. H. GRISDALE,
Agriculturist.

HORSES.

There are in the farm stables at present fourteen horses. A number of these are quite old and will need to be replaced at an early date. During the year, one horse has died. His death was caused by colic. A new team was purchased in April and has proven entirely satisfactory.

Three of the above horses are required for the omnibus which runs from the farm to the city, making three trips daily. One is used for a driver and two for cart or general jobbing horses.

The remaining eight horses constitute the teams for general work upon the farm, in the gardens and orchards, upon the lawns and in the arboretum, as well as for cartage. This number of horses has, during the past year, proven to be very far short of the requirements as detailed above, and another team is very much needed.

On March 6, 1900, an experiment in feeding work horses was incepted, the end in view being to ascertain the comparative economy of feeding whole as contrasted with ground grain, also the gaining of some data as to the comparative value of oats, barley and corn as grain rations for working horses. A uniform ration of 12 pounds per diem was adopted to permit of comparing results. The experiment was discontinued after May 6, as it was found that on the heavy spring work a more varied and better ration was required than was being fed some of the horses.

It will be observed that in feeding ground vs. unground grain, the ground grain was fed to old and the unground grain to young horses.

LOT ON WHOLE GRAIN, 12 POUNDS—OATS AND BARLEY.

Horse.	Mixture Fed.	March 6, Weight.	April 6, Weight.	May 6, Weight.	Loss or Gain.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Polly	Oats 10, Barley 2	1,270	1,230	1,230	40	Unusually heavy work part of time.
Dolly		1,390	1,382	1,402	12	

These two animals were seven and eight years old, respectively. They continued in excellent health throughout the time of the experiment.

LOT ON GROUND GRAIN, 12 POUNDS—OATS AND BARLEY.

Horse.	Mixture Fed.	March 6, Weight.	April 6, Weight.	May 6, Weight.	Loss or Gain.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Rock	Oats 10, Barley 2	1,460	1,455	1,495	35	
Daisy		1,345	1,410	1,350	5	Idle part of time in March.

While this team lost considerable in weight during the time of the experiment, they continued in good health. They were in better working condition at the end than at the beginning of the feed test. Rock was eighteen years old, and Daisy twenty-one.

LOT ON CORN AND OATS (GROUND), 12 POUNDS.

Horse.	Mixture Fed.	March 6, Weight.	April 6, Weight.	May 6, Weight.	Loss or Gain.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Fanny	Corn 6, Oats 6	1,670	1,645	1,655	15	
Ben		1,575	1,575	1,512	63	

Fanny was seven years old, and Ben fifteen. In spite of 12 pounds per diem, a very light ration for such heavy horses, they appeared to thrive upon it. After the ration was increased they did better, however.

LOT ON GROUND CORN, 12 POUNDS.

Horse.	Mixture Fed.	March 6, Weight.	April 6, Weight.	May 6, Weight.	Loss or Gain.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Charlie	Corn.. 12	1,315	....	....	....	Went off feed in eight days.
George	"	1,450	1,395	1,455	5	

Charlie, aged twenty, and George twenty. Charlie could not stand this ration, and so dropped out of the experiment in a short time. George, as appears above, did well upon this ration in spite of the too great proportion of starch and fat.

PURE BRED BREEDING CATTLE.

There are on the farm at present representatives of two breeds of cattle: Ayrshires and Guernseys.

Ayrshires.

1 bull, 'Matchless Again' (8757)........................2 yr. old
1 cow, 'Darling'..2 yr. old
1 calf, bull..3 mos. old
1 calf, heifer..8 mos. old

Guernseys.

1 bull, 'Wedgewood' (5,113)...............................6 yrs. old
1 cow, 'Ruby'...2 yrs. old
1 bull..2 yrs. old
1 calf..6 mos. old

It is proposed to secure a few more females of each breed represented, and of a milking strain of Shorthorns. Small herds of pure bred animals of each of the three breeds will be maintained, and small graded herds of the respective breeds as well. It is hoped to gain some data as to the exact value of bulls in grading up a herd in a given time.

The services of the stock bulls are available to farmers upon payment of a moderate charge.

DAIRY CATTLE.

The herd of dairy cattle consists of 31 females, all told. They are :—

Milking Stock.

Ayrshires...1
Guernseys...1
Canadian grades...5
Ayrshire grades...6
Other grades..7

Young Stock.

Two-year olds	5
Yearlings	2
Calves	4

During the year some of the older and less valuable cattle have been sold to the butcher.

The dairy cows have been fed a roughage ration of corn ensilage 35 pounds, chaff 3 pounds, hay 5 pounds, and mangels 20 pounds daily; some more, some less, according to ability to use food profitably.

The meal ration varied in quantity on the same principle, some cows getting as low as 2 pounds per diem, while in milk, and others eating as much as 10 pounds per diem. The meal ration mixture was made up of bran ½, oats 1-6, peas 1-6, and barley 1-6, in most cases, but was varied to suit individual tastes and requirements.

Much attention has been paid to the individuality of the animals, with marked results. The average yield of butter and milk has increased materially over last year, namely, from an average of 242·5 to 289·6 pounds butter, and from 5,414 to 6,455 pounds milk. This is due in a great measure to larger returns from individuals of the herd, but to a certain extent to the weeding out process, which has been most rigorously pursued, no animal falling much below last year's average being allowed to remain in the herd, heifers of course being excepted.

In estimating the cost of feeding, the following prices were charged for feed stuffs, being the local market rates for the same save in the cases of roots and ensilage, which are charged at the usual values affixed in experimental work:—

Pasture	$1 per month
Bran	$15 per ton
Oats, barley and pease	19 per ton
Chaff	4 per ton
Clover hay	5 per ton
Roots and ensilage	2 per ton

In estimating the cost of feeding heifers, they were charged for that part of the year during which they were milking, while other milkers were charged for the whole year. While dry, cows were charged at the rate of $2 per month in winter and $1 per month in summer.

The average cost of feeding has been materially reduced from last year by selection, by the feeding more freely of cheaper feed stuffs and by studying the individuality of the cows.

In estimating the value of the product, 19 cents is allowed for a pound of butter, and 15 cents per 100 pounds of skim-milk and buttermilk. The butter is manufactured in the farm dairy, and sells on the market at from 22 to 30 cents per pound, an average of about 24½ cents. This leaves 5½ cents per pound for cost of manufacture.

The following tables will be of interest, as showing the records of the individual cows, and giving some general results :—

Number.	Cow.	Breed.	Days of Milking.	Lbs. Milk.	Per cent of B. Fat.	Lbs. Butter.	Total Value of Product.	Cost of Feed.	Profits.
							$ cts.	$ cts.	$ cts.
1	Dewdrop	Ayrshire Grade	350	10,595	3·4	436·25	97 35	40 85	56 50
2	Julia	....	364	9,314	3·7	408·75	91 17	40 75	50 42
3	Della	Shorthorn	327	8,548	4·0	411·60	90 35	40 90	49 45
4	Begonia	Canadian Grade	267	8,975	3·6	385·80	86 05	39 30	46 75
5	Belle	Ayrshire "	316	8,429	3·7	371·40	82 56	39 25	43 31
6	Dora	" "	354	9,760	3·1	358·33	82 10	40 85	41 25
7	Polly	....	330	7,591	3·8	345·33	76 41	37 00	39 41
8	Gipsy	Ayrshire Grade	294	7,506	3·4	307·10	69 15	38 90	30 25
9	Forest Girl	Shorthorn "	329	6,834	4·0	324·50	69 40	38 90	28 50
10	Dairy Maid	" "	349	5,650	4·7	314·70	67 74	40 90	26 84
11	Tulip	Canadian "	271	4,342	4·7	242·50	52 22	25 50	26 72
12	Norette	" "	251	6,418	3·3	275·50	61 34	35 60	25 74
13	Florence	Shorthorn "	315	6,141	3·8	278·60	61 63	36 90	24 73
14	Theresa	Canadian "	319	5,852	4·0	281·50	61 73	37 00	24 73
15	*Ruby	Guernsey	197	3,272	4·9	188·90	40 54	17 00	23 54
16	Bloom	....	286	6,967	3·4	279·33	63 06	41 00	22 06
17	*Laura	Ayrshire Grade	269	4,212	3·5	180·90	40 37	22 00	18 37
18	May Belle	Shorthorn "	282	3,834	3·0	169·33	38 57	33 75	4 82
19	*Darling	Ayrshire	55	1,381	4·0	62·50	13 82	9 50	4 32
20	Hazel	Canadian Grade	222	3,479	4·0	169·20	37 09	36 20	0 89
							1,282 65	694 05	588 60

* Heifer.

—	December.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	Total.
Lbs. of milk	7,381	8,918	8,846	11,081	11,994	12,311	15,850	12,804	12,383	10,255	9,752	7,523	129,100
Lbs. of butter fat	324·61	335 38	317·94	429·61	374·89	438·55	542·81	475·78	455·89	411·28	420·86	337·84	4,865·44
Per cent butter fat	4·37	3·76	3·69	3·87	3·13	3·56	3·59	3·71	3·68	4 01	4·30	4·48	*3·76
Lbs. of butter	386·50	399·33	378·50	511·33	446·33	522·00	646·20	566·40	542·70	489·50	501·03	402·20	5,792·02
Lbs. of milk for 1 lb. butter	19·1	22·3	23 4	21·7	26·9	23·6	24·5	22·6	22·8	20·9	19·4	18·7	21·9

*Average.

Time of Milking Experiment.

The question of the effect of milking cows at equal or unequal intervals is one which frequently presents itself, and a small experiment along this line was conducted during the month of November. Below is submitted a particularized report of the results, while a general report or summary follows :—

TIME OF MILKING EXPERIMENT.

Period.	November.	Hours of Milking.	Darling.				Hazel.				Ruby.				Theresa.				Total.
			Morning		Evening		Morning		Evening		Morning		Evening		Morning		Evening		
			Milk.	p.c. Fat.	Milk.	p.c. Fat.	Milk.	p.c. Fat.	Milk.	p.c. Fat.	Milk.	p.c. Fat.	Milk.	p.c. Fat.	Milk.	p.c. Fat.	Milk.	p.c. Fat.	Total.
Average for previous 10 days.	..	6 a.m. & 4.30 p.m.	15	3·5	14	3·9	13	3·9	11	4·1	8	4·5	6	4·9	10	3·5	8	3·9	85
Period of change.	2	6 a.m. & 6 p.m.	13½	3·8	14½	3·8	13	4·4	10	4·3	6	5·8	5	5·7	9½	4·3	8	4·2	79½
	3		13½	3·9	14	3·4	12	4·6	12	4·4	5½	6·0	53	5·4	7½	3·4	6½	4·2	76½
	4		13½	3·7	14½	3·9	12½	4·8	11	4·1	5½	5·5	5½	5·8	7	4·4	6½	4·7	76
Total for period..			40½	...	43	..	37½	....	33	...	17	....	16	....	24	....	21	...	232
Milking at equal intervals.	5	6 a.m and 6 p.m.	13½	3·8	13½	3·7	11	4·4	9½	4·3	5½	6·0	5½	6·0	7½	4·8	6	4·8	72
	6		14	3·6	13½	3·4	10½	4·6	9	4·1	5	6·0	5½	6·0	7	4·8	6½	4·6	71
	7		13	3·4	14	3·7	9	4·4	9½	4·5	5	6·0	5½	6·4	6½	4·6	6½	4·1	69
	8		13	3·8	13½	3·9	11	4·5	10	4·0	5	5·5	5½	5·1	7	4·3	7	4·6	72
	9		12	3·5	13	3·7	10½	4·3	10	4·4	5	5·7	5	5·2	7½	4·7	7	5·0	70
	10		13	4·0	13	3·7	11	4·3	10	4·3	5½	6·1	5½	6·2	6½	4·8	7	4·4	71½
	11		12½	4·1	12½	3·9	11	4·4	10½	4·3	5½	6·5	5	6·6	7	5·3	6½	4·7	70½
	12		13	3·9	13	3·9	11½	4·6	10	4·7	6	6·4	5	6·5	7½	5·2	6½	4·6	72½
	13		13½	4·0	13½	3·8	11½	4·4	10½	4·6	5½	6·4	5½	6·5	8	5·1	7	5·2	75
	14		13	3·7	13½	3·9	12½	4·7	11	4 4	5½	7·1	5	6·9	8	4·7	7½	5·0	76
Total for period....			130½	....	133	....	109½	....	100	....	53½	....	53	....	72½	....	67½	....	719½
Period of change.	15	6 a.m. & 4.30 p.m.	14	4·0	12½	4·5	11	4·4	9	4·4	5½	6·8	4	6·0	8	4·8	6½	4·4	71½
	16		14½	3·7	12	4·4	11½	4·3	8½	4·7	6	5·4	4	6·3	9	4·6	6	4·9	71½
	17		15	3·9	12	4·7	12	4·4	8½	4·4	5½	5·2	4	6·2	8½	4·5	6	5·0	71½
	18		14	3·9	11½	4·6	12	4·6	8½	4·8	5½	5·5	4	6·9	7½	4·4	5	5·0	68
Total for period....			57½	....	48	...	46½	...	34½	....	22½	....	16	....	33	....	17½	...	282½
Milking at unequal intervals.	19	6 a.m. and 4. 30 p.m.	14½	3·9	11½	4·4	11½	4·1	8½	4·4	5	5·5	4½	6·1	7	4·7	5½	5·2	68
	20		14	3·5	12	4 4	11½	4·0	8½	4·8	6	5·8	4	6·3	7	5·0	5½	5·4	68½
	21		14	3·1	12	3·6	12	3·8	9	4·2	6½	5·7	4½	6·0	8½	4·6	6	4·4	72½
	22		15	3·4	12½	4·0	12½	4·0	9	4·6	6	5·5	4½	6·2	8	4·1	6	4·9	73½
	23		14½	3·6	13	4·2	11½	4·1	8½	4·6	5½	5·2	4½	5·6	8	4·5	6½	4·6	72
	24		14	3·2	12½	4·0	12½	4·0	9	4·5	6½	4·8	4½	6·4	8	4·0	6	4·2	73
	25		11½	4·0	11	4·5	12	4·4	8	4·3	6	5·8	4½	5·9	8	4·3	6	4·6	67
	26		13	3·5	12	4·4	12	4·0	8½	4·4	7	5·7	4	6·3	7½	4·4	5½	4·5	69½
	27		13½	3·8	12	4·2	11½	4·0	8½	4·8	6	5·6	4	6·0	7	4·4	5	4·7	67½
	28		12½	3·6	12	4·4	11	4·3	8½	4·9	6	5·3	4½	6·4	7½	4 6	6	4·6	68
Total for period....			136½	....	120½	....	118	....	86	....	61½	....	43½	....	76½	....	58	....	699½

SUMMARY.

DARLING—AYRSHIRE.

Average.	Average for Previous 10 Days.	1st Period of Change.	Milking Equal Intervals.	2nd Period of Change.	Milking Unequal Intervals.
Per cent fat morning	3·5	3·80	3·78	3·87	3·56
" " evening	3·9	3·61	3·75	4·55	4·21
" " whole day	3·7	3·71	3·76	4·18	3·86
Yield of butter fat	1·061 lbs.	1·037 lbs.	0·988 lbs.	1·102 lbs.	0·993 lbs.

HAZEL—GRADE.

Per cent fat morning	3·9	4·70	4·46	4·41	4·17
" " evening	4·1	4·27	4·41	4·51	4·55
" " whole day	4·0	4·49	4·43	4·46	4·36
Yield of butter fat	0·960 lbs.	1·055 lbs.	0·923 lbs.	0·903 lbs.	0·889 lbs.

RUBY—GUERNSEY.

Per cent fat morning	4·5	5·75	6·27	5·68	5·45
" " evening	4·9	5·65	6·20	6·35	6·26
" " whole day	4·7	5·70	6·24	6·01	5·85
Yield of butter fat	0·654 lbs.	0·627 lbs.	0·664 lbs.	0·578 lbs.	0·608 lbs.

THERESA—QUEBEC JERSEY GRADE.

Per cent fat morning	3·5	3·70	4·83	4·57	4·46
" " evening	3·9	4·36	4·70	4·82	4·71
" " whole day	3·7	4·03	4·76	4·69	4·58
Yield of butter fat	0·662 lbs.	0·585 lbs.	0.576 lbs.	0·672 lbs.	0·616 lbs.

A study of the above records would indicate :

1. That the percentage of butter fat in the milk, from morning or evening milking, is influenced by the comparative length of interval between the milking hours.

2. The richer milk is found to be produced after the shorter interval.

3. Where intervals between milkings are equal, no appreciable difference appears to exist in either the quality or quantity of the milk drawn in the morning or in the evening.

4. Periods of change in hours of milking are evidently periods of excitement and affect individuals differently.

STEER EXPERIMENTS.

The experiments with steers during the year have been along the line of determining the comparative economy (1), of feeding dehorned steers loose as contrasted with feeding dehorned steers tied, and feeding steers not dehorned tied ; (2) of feeding yearlings, two-year olds, or three-year olds ; (3) feeding steer calves a limited or growing ration, or feeding them a heavy or fattening ration.

The data secured in the loose versus tied experiment do not agree with results of similar work conducted elsewhere. The conditions in the case of the lot fed loose were possibly not so favourable as in the case of the lots fed tied. The temperature was on the average 10 or 12 degrees lower in the case of the lot fed loose. Nine steers were in each lot. It is possible that had there been fewer steers in the lots different results would have been observed. Ample space was allowed at the feed troughs for all, but the stronger steers made relatively greater gains than those of a quieter or more timid disposition. To test the relative economy of feeding a small or a large number together, there are being fed here at present lots of 9, 6 and 3 steers each. Exactly the same floor space is allowed per steer in each lot, namely, 62 square feet.

The rations fed the different lots were, of course, similar. The grain or meal was exactly the same per lot, whether tied or loose. The roughage, or at least the mixture of roots, ensilage, chaff and hay being limited only by the appetite of the lots. The lot fed loose ate much more of this than the lots fed tied. The exercise possible in the pen where they were fed was quite insufficient to account for this, nor would the difference in temperature mentioned above, for the greatest differences in the amounts of roughage consumed were observed when the temperatures were similar in March, April and part of May.

FEEDING STEERS.

No experiments with feeding stuffs have been conducted during the year. In November, 1899, there were put up to feed 77 steers. These cost in the stables, $2,464. The total cost to feed them was $966.85, making a gross cost of $3,430.85. They sold for $3,773,14, leaving a net profit of $342.29. The average net profit per steer was $4.44.

In estimating the cost of feeding, the following prices were charged:—

	Per ton.
Clover hay	$5 00
Straw	3 00
Ensilage	2 00
Roots, 6 cents per bushel or	2 00
Corn	16 00
Oats, pease or barley	19 00
Bran	15 00
Oil meal	35 00

The steers were fed twice a day, morning and night. A mixture of roots (as long as roots lasted), ensilage, straw and meal being given first each meal, followed by a light feed of long hay. For the first few weeks no grain or meal was fed, and later the grain ration grew gradually till about six pounds per diem was being fed. A somewhat different plan was followed in the case of the yearlings, however, which received no grain till April.

The meal ration consisted of half corn, half oats, pease, barley and bran, equal parts. About six weeks before selling, an addition of a small amount of oil meal was made to this ration, starting with one-third pound per diem, and going up to one and a half pounds.

Below are statements of the results in some of the different lots :—

STATEMENT of weights and gains of Steers in Tied vs. Loose Experiment.

Lot I.—Dehorned, Tied.—9 Steers.

First weight	pounds	8,655
Finished weight	"	10,905
Total gain in 184 days	"	2,250
Daily gain per steer	"	1·36
Gross cost of feed		$133.17
Cost of 1 pound gain	cents	5·9

Lot II.—Dehorned, Loose.—9 Steers.

First weight	pounds	8,650
Finished weight	"	10,805
Total gain in 184 days	"	2,155
Daily gain per steer	"	1·30
Gross cost of feed		$140.58
Cost of 1 pound gain	cents	6·5

Lot III.—Not Dehorned, Tied.—9 Steers.

First weight	pounds	8,635
Finished weight	"	11,074
Total gain in 181 days	"	2,439
Daily gain per steer	"	1·49
Gross cost of feed		$151.78
Cost of 1 pound gain		6·2

STATEMENT of particulars in comparative feeding of Yearlings, Two-year-olds and Three-year-olds:

Yearlings.

Number of steers in lot		9
First weight	pounds	7,275
Finished weight	"	9,193
Total gain in 192 days	"	1,918
Total gain per steer (average)	"	213·1
Daily gain per steer	"	1·11
Gross cost of feed		$95.87
Cost of 1 pound gain		0 05
Cost of steers, 7,275 pounds at $3.25 per cwt		$236 33
Total cost to produce beef, $236.33 + $95.87		332 20
Sold 9,193 pounds at $4.50 per cwt		413 68
Profit on lot		81 48
Net profit per steer		9 05

Two-year-olds.

Number of steers in lot		9
First weight	pounds	8,635
Finished weight	"	11,074
Total gain in 181 days	"	2,439
Total gain per steer (average)	"	271
Daily gain per steer	"	1·49
Gross cost of feed		$151 78
Cost of 1 pound gain	cents	6·2
Cost of steers, 8,635 pounds at $3.50 per cwt		$302 22
Total cost to produce beef, $302.22 + $151.78		454 00
Sold 11,074 pounds at $4.65 per cwt		514 94
Profit on lot		60 94
Net profit per steer		6 77

Three-year-olds.

Number of steers in lot		9
First weight	pounds	10,065
Finished weight	"	12,655
Total gain in 188 days	"	2,590
Total gain per steer (average)	"	287
Daily gain per steer	"	1·53
Gross cost of feed		$176.27
Cost of 1 pound gain	cents	6·8
Cost of steers, 10,065 pounds at $3.75 per cwt		$377 81
Total cost to produce beef, $377.81 + $176.27		554 08
Sold 12,655 pounds at $4.75 per cwt		601 11
Profit on lot		47 03
Net profit per steer		5 22

STEER CALF EXPERIMENT.

In the early part of May, 10 bull calves of at least three fourths Shorthorn blood were purchased and castrated. They were from ten days to a month old. The fact of their not having been castrated at an earlier age was somewhat against them.

On May 12 they were divided into two groups of five steers each.

Lot I was fed a limited growing ration.

Lot II was fed a full fattening ration from the start, by full fattening ration being meant, of course, one suited to growing stock.

A study of the subjoined synopses of the feeder's records will show the exact differences between the two rations.

In estimating cost of feeding calves the following values were placed on the various feeds used:—

Clover hay	25 cents per cwt.	Bran............	$0 75 per cwt.
Roots and ensilage.	10 " "	Oilmeal..........	1 75 per cwt.
Corn............	80 " "	Bibby's cream.....	
Oats, pease or barley............	95 " "	Equivalent.......	3 50 per cwt.
		Skim milk........	15 "

Lot I—Limited Growing Ration.

1900 Week Ending.	Skim Milk.	Oats.	Corn.	Oil Meal.	Barley.	Bran.	Shorts.	Peas.	Roots.	Ensilage.	Straw.	Hay.
May, 19	525	8¾	...	...	...	...	...	...	...	35	...	17½
" 26	525	8¾	...	...	...	...	...	...	...	35	...	17½
June, 2	525	8¾	...	...	...	...	...	...	...	35	...	17½
" 9	525	8¾	...	...	...	...	...	...	...	35	...	17½
" 16	525	8¾	...	...	...	...	17½	...	...	...	...	35
" 23	525	8¾	...	...	...	...	17½	...	...	...	...	35
" 30	525	17½	...	...	...	8¾	17½	...	...	...	...	35
July, 7	350	17½	...	...	...	8¾	17½	...	...	...	...	35
Total for 8 weeks..	4025	87½	...	...	...	17½	70·0	...	...	140·0	...	210·0
July, 14	350	17½	...	...	...	8¾	17½	...	...	...	...	35
" 21	350	17½	...	...	...	8¾	17½	...	...	...	...	35
" 28	350	17½	...	...	...	17½	17½	...	...	...	...	35
Augt. 4	350	24½	...	...	...	17½	17½	...	...	...	...	70
" 11	350	24½	...	...	...	17½	17½	...	...	...	...	70
" 18	350	24½	...	...	...	24½	24½	...	...	...	...	70
" 25	350	24½	...	...	...	24½	24½	...	...	...	...	70
Sept. 1	350	24½	...	...	...	24½	24½	...	...	...	...	70
Total for 8 weeks..	2800	175·0	...	...	...	143½	161·0	...	...	...	...	455·0
Sept. 8	350	24½	...	...	...	24½	24½	...	...	...	...	70
" 15	350	26¼	...	...	...	26¼	26¼	...	...	...	...	70
" 22	...	26¼	...	...	...	26¼	26¼	...	...	...	...	70
" 29	...	35	...	...	...	35	26¼	...	...	...	...	70
Oct. 6	...	35	...	...	...	35	26¼	...	...	...	...	70
" 13	...	35	...	...	...	35	35	...	...	...	...	70
" 20	...	35	...	...	...	35	35	...	...	...	...	70
" 27	...	35	...	...	...	17½	17½	...	...	...	...	70
Total for 8 weeks..	700	252	...	...	...	234½	217	...	...	...	...	560
Nov. 3	...	35	...	...	...	35	...	...	...	70	...	Pasture
" 10	...	35	...	...	...	36	...	...	...	70	...	Pasture
" 17	...	35	...	...	...	17½	17½	...	...	70	...	35
" 24	...	35	...	...	17½	35	17½	...	70	3	...	35
Dec. 1	...	35	...	...	17½	35	17½	...	70	35	...	35
Total for 4 weeks..	...	175	...	...	35	157½	52½	...	140	280	...	105

Lot II--Full Fattening Ration.

1900. Week Ending.	Skim milk.	Oats.	Corn.	Oil meal.	Barley.	Bran.	Shorts.	Peas.	Roots.	Ensilage.	Straw.	Hay.
May, 19	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	....	....	....	....	....	35	....	$17\frac{1}{2}$
" 26	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	....	....	....	....	....	35	....	$17\frac{1}{2}$
June, 2	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	....	....	....	....	....	35	....	$17\frac{1}{2}$
" 9	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	....	....	....	....	....	35	....	$17\frac{1}{2}$
" 16	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	....	....	....	....	....	....	....	35
" 23	525	$8\frac{3}{4}$	$2\frac{3}{16}$	$2\frac{3}{16}$	....	$4\frac{6}{16}$	....	....	....	....	....	35
" 30	525	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{6}{16}$	....	$4\frac{6}{16}$	....	....	....	....	....	35
July, 7	350	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{6}{16}$	....	$4\frac{6}{16}$	....	....	....	....	....	35
Total for 8 weeks	4,025	$87\frac{1}{2}$	$21\frac{14}{16}$	$21\frac{14}{16}$	....	$13\frac{2}{16}$	....	....	....	140	....	210
July, 14	350	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{6}{16}$	....	$4\frac{6}{16}$	....	....	....	....	....	35
" 21	350	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{6}{16}$	....	$4\frac{6}{16}$	....	....	....	....	....	35
" 28	350	$17\frac{1}{2}$	$4\frac{6}{16}$	$4\frac{9}{16}$	....	$17\frac{1}{2}$	....	....	....	....	....	35
Aug. 4	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$6\frac{9}{16}$		$17\frac{1}{2}$	....	....	....	....	....	70
" 11	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$6\frac{9}{16}$	....	$17\frac{1}{2}$	....	....	....	....	....	70
" 18	350	$24\frac{1}{2}$	$10\frac{1}{2}$	$10\frac{1}{2}$	....	$17\frac{1}{2}$	....	....	....	....	....	70
" 25	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$10\frac{1}{2}$	....	$24\frac{1}{2}$	....	....	....	....	....	70
Sept. 1	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$10\frac{1}{2}$	....	$24\frac{1}{2}$	....	....	....	....	....	70
Total for 8 weeks	2,800	175	$49\frac{14}{16}$	$57\frac{3}{4}$	....	$127\frac{3}{4}$	....	....	....	....	....	455
Sept. 8	350	$24\frac{1}{2}$	$6\frac{9}{16}$	$10\frac{1}{2}$	....	$24\frac{1}{2}$	....	....	....	....	....	70
" 15	350	$17\frac{1}{2}$	$8\frac{3}{4}$	$10\frac{1}{2}$	....	$17\frac{1}{2}$	....	....	....	....	....	70
" 22	....	$26\frac{1}{4}$	$8\frac{3}{4}$	$12\frac{1}{4}$	....	$17\frac{1}{2}$	....	....	....	....	....	70
" 29	....	$26\frac{1}{4}$	$8\frac{3}{4}$	$12\frac{1}{4}$	....	$17\frac{1}{2}$	....	....	....	....	....	70
Oct. 6	....	35	$12\frac{1}{4}$	$12\frac{1}{4}$	....	$17\frac{1}{2}$	....	....	....	....	....	70
" 13	....	35	$12\frac{1}{4}$	$12\frac{1}{4}$	....	$17\frac{1}{2}$	....	....	....	....	....	70
" 20	....	35	$26\frac{1}{4}$	$12\frac{1}{4}$	....	$17\frac{1}{2}$	....	....	....	....	....	70
" 27	....	35	$26\frac{1}{4}$	$19\frac{1}{4}$	....	$17\frac{1}{2}$	....	....	....	....	....	70
Total for 8 weeks	700	$234\frac{1}{2}$	$109\frac{13}{16}$	$101\frac{1}{2}$	....	147	....	....	....	....	....	560
Nov. 3	....	35	35	....	....	$17\frac{1}{2}$	....	....	....	70	....	Pasture
" 10	....	35	35	....	....	$17\frac{1}{2}$	....	....	....	70	....	Pasture
" 17	....	35	35	....	....	$17\frac{1}{2}$	....	....	70	35	....	35
" 24	....	35	35	....	....	35	....	....	70	35	....	35
Dec. 1	....	35	35	....	....	35	....	....	105	35	....	35
Total for 4 weeks	....	175	175	....	....	$122\frac{1}{2}$	....	....	245	245	....	105

The following tables contain a synopsis of results observed to December 1, 1900.

LOT I. LIMITED GROWING RATION—FIVE STEERS.

Period.	Total Gain of Lot.	Daily Rate of Gain per Steer.	Cost to Feed Lot.	Cost of 1 Lb. Gain.	Cost to Feed 1 Steer 1 Day.	Remarks.
	Lbs.	Lbs.	\$ cts.	cts.	cts.	
First period 8 weeks	299	1·30	8 25	2·75	2·94	Lot weighed 595 lbs. May 14, or an average of 119 lbs.
Second "	344	1·11	9 42	2·73	3·36	
Third "	328	1·06	8 43	2·57	3·01	
Fourth 4 weeks	319	2·12	4 29	1·34	3·08	
Aggregate or average	1,290	1·31	30 39	2·35	3·10	Total weight 1,885 lbs. December 1.

LOT II. FULL FATTENING RATION—FIVE STEERS.

Period.	Total Gain of Lot.	Daily Rate of Gain per Steer.	Cost to Feed Lot.	Cost of 1 Lb. Gain.	Cost to Feed 1 Steer 1 Day.	Remarks.
	Lbs.	Lbs.	$ cts.	cts.	cts.	
First period 8 weeks....	310	1·35	8 18	2·63	2·90	Lot weighed 751 lbs. May 14, or an average of 150 lbs.
Second "	373	1·20	9 37	2·51	3·34	
Third " ...	418	1·37	8 44	2·01	3·01	
Fourth period 4 weeks...	313	2·08	6 85	2·19	4·89	
Aggregate or average....	1,414	1·44	32 84	2·32	3·35	Total weight 2,165 lbs. December 1.

PIGS.

At present the stock of breeding pigs consists of the following pure bred animals :

Improved Large Yorkshires..	1 boar..	9 months.
	2 sows..	1 year.
	3 sows..	9 months.
Improved Berkshires........	1 boar..	2½ years.
	2 sows..	9 months.
Tamworths...............	1 boar ..	2 years.
	1 sow..	15 months.
	1 sow..	6 months.

There are besides a number of young Yorkshires and Tamworths about three months old.

The 'soft' pork investigations are being continued, a full report of which will be published at a later date.

Economy of Pork Production.

A number of pigs have been fed upon artichokes (see page 94) on rape, (see page 92) on pumpkins, raw and cooked; (see page 93) on clover pasture, on steamed clover, on mangels, on grain alone, on grain and milk, on grain alone, fed three times a day, and on similar grain fed from a self-feeder.

The following statements will indicate the comparative economy of the various rations or methods of feeding :—

Statement A.

Lot of 5 pigs on clover pasture and grain—

To 5 pigs, average weight 90 pounds, at $5.50 each........	$ 27 50
½ acre clover pasture (see page for value)........	4 50
1,600 pounds meal at 90 cents..................	14 40
Total..........................	$ 46 40
By 900 pounds pork at $6 per cwt................	$ 54 00
Profit on lot..........................	7 60
Profit per pig..........................	1 52
Cost to produce 100 pounds pork................	4 20

Statement B.

Lot of 6 pigs on steamed clover and grain—

To 6 pigs, average weight 73 pounds, at $4.50 each	$ 27 00
¾ tons clover at $5	3 75
1,475 pounds meal at 90 cents	13 27
Total	$ 44 02
By 1,085 pounds pork at $6 per cwt	$ 65 10
Profit on lot	21 08
Profit per pig	3 51
Cost to produce 100 pounds pork	2 63

Statement C.

Lot of 6 pigs on mangels and grain—

To 6 pigs, average weight 73 pounds, at $4.50 each	$ 27 00
6,200 pounds mangels at $2 per ton	6 20
1,350 pounds grain at 90 cents per cwt	12 15
Total cost	$ 45 35
By 1,112 pounds pork at $6 per cwt	$ 66 72
Profit on lot	21 37
Profit per pig	3 56
Cost to produce 100 pounds pork	2 87

Statement D.

Lot of 6 pigs fed on grain alone—

To 6 pigs, average weight 73 pounds, at $4.50 each	$ 27 00
2,123 pounds grain at 90 cents per cwt	19 11
Total cost	$ 46 11
By 1,068 pounds pork at $6 per cwt	$ 64 08
Profit on lot	17 97
Profit per pig	2 99
Cost to produce 100 pounds pork	3 03

Statement E.

Lot of 6 pigs fed on grain and milk—

To 6 pigs, average weight 43 pounds, at $3 each	$ 18 00
1,340 pounds skim milk at 15 cents per cwt	2 01
2,003 pounds meal at 90 cents per cwt	18 03
Total cost	$ 38 04
By 1,152 pounds pork at $6 per cwt	$ 71 12
Profit on lot	33 08
Profit per pig	5 51
Cost to produce 100 pounds pork	2 24

Statement F.

Lot of 5 pigs fed grain only three times a day—

To 5 pigs, average 120 pounds, at $7.50 each	$ 37 50
1,289 pounds meal at 90 cents per cwt.	11 60
Total cost	$ 49 10
By 953 pounds pork at $6 per cwt.	$ 55 18
Profit on lot	6 08
Profit per pig	1 21
Cost to produce 100 pounds pork	3 28

Statement G.

Lot of 5 pigs on self-feeder—

To 5 pigs, average weight 98 pounds, at $6.00 each	$ 30 00
1,907 pounds grain at 90 cents	17 16
Total cost	$ 47 16
By 958 pounds pork at $6 per cwt	$ 57 48
Profit on lot	10 32
Profit per pig	2 06
Cost to produce 100 pounds pork	3 57

In the foregoing statements a uniform selling price has been used to permit of comparison of profits. The actual selling prices were as follows :—A, $6 per cwt.; B, $5.25 per cwt.; C, $5.25 per cwt.; D, $5.25 per cwt.; E, $6.25 per cwt.; F, $6 per cwt.; G, $6 per cwt.

The differences in prices are due to the then state of the market, and so should not be considered in making a comparison of profits.

The meal fed in every case consisted of one-half corn, one-half oats, pease and barley, equal parts. This was worth on the markets sometimes 95 cents per cwt., at other times 85 cents per cwt., so an average price of 90 cents per cwt. has been charged.

The question of age enters into the relative profits as well as into the relative costs of producing 100 pounds gain. The pigs in A, F and G were considerably older than in the other lots, and so the greater cost of gain must in some measure be attributed to this fact.

SHEEP.

The flocks on the Central Experimental Farm are kept to use to the best advantage a bit of stony land and to carry on some experimental work in breeding and feeding.

THE FLOCKS.

The flocks consist of: Leicesters, 1 ram and 7 ewes; Shropshires, 1 ram and 8 ewes; grades, 6 bred to Leicester ram and 3 bred to Shropshire ram.

A very good lamb crop came in the spring, an average of 1⅜ lambs to breeding ewe. The lambs did not do as well at first as was anticipated, the trouble being the small white intestinal worm. Since ridding them of this dangerous pest, however, they have done exceedingly well.

CARE AND MANAGEMENT OF BREEDING EWES.

All too frequently the care and proper management of his flock of breeding ewes receives scant attention from the farmer. He thinks them able to shift for themselves, and, as a result, declares sheep 'no good.' A little care and a very small expenditure of money would frequently change this verdict and leave a nice balance in favour of the smallest as well as the larger flocks.

Accordingly, a few suggestions as to the care of breeding ewes are offered.

In the Autumn.

In the autumn, just prior to the mating season, the ewe should be given fresh pasture or a small feed of grain to start her gaining in flesh. This should be kept up through the mating season and may be expected to show up in results at lambing time with an increased percentage of lambs.

As the housing time draws near, see that the fold is in good condition, that is, clean and free from holes likely to cause draughts. A cool, well-ventilated, clean pen means good, healthy sheep and sturdy lambs. While shelter and cleanliness, with pure, cool air, are essential, exercise is imperative, if a good lamb crop is to be hoped for. Of course, mild exercise is understood.

The winter ration should consist largely of roots (turnips) and clover hay or pea straw. Ensilage has been fed with great success. As lambing time draws on, less roots should be fed. The milking ewe needs a considerable addition to the roughage ration and mangels, with clover or pea straw and some shorts or bran and crushed oats, suit her well.

An excellent supplementary food in summer is afforded by rape. This is especially good for lambs. They may be allowed to nibble it at will, having other pasture to run on at the same time.

.FARM CROPS.

The rotation mentioned in the report for 1899 is being followed. The following crops have been grown during this year:—

OATS.

Five varieties of oats were grown, namely, Banner, Improved, Ligowo, Golden Beauty, American Beauty and Siberian. They were sown on land that had been in roots, corn or potatoes the preceding year. In the autumn after the above-mentioned crops had been harvested, the land was ribbed, as is done in sowing turnips or mangels, and left lying so till the spring, when it was broken down and sown. The particulars of the varieties grown are as follows :—

Golden Beauty.—4¼ acres, sown May 2, 1¾ bushels per acre, matured in 103 days, August 13. Yielded 48 bushels per acre. Measured bushel weighed 40½ pounds.

Siberian.—6½ acres, sown May 3, 1¾ bushels per acre, matured in 105 days, August 16. Yielded 54¼ bushels per acre. Measured bushel weighed 42 pounds.

American Beauty.—4½ acres, sown May 2, matured in 103 days, August 13. Yielded 47½ bushels per acre. Measured bushel weighed 40 pounds.

Improved Ligowo.—8¾ acres, sown April 28, 1¾ bushels per acre, matured in 98 days, August 4. Yielded 50⅞ bushels per acre. Measured bushel weighed 42½ pounds.

Banner.—12 acres, sown April 30, 2 bushels per acre, matured in 100 days, August 8. Yielded 60⅓ bushels per acre. Measured bushel weighed 40 pounds.

Below is a statement of cost of growing this lot of oats, with an estimate of the cost of providing digestible dry matter through this crop:—

Cost of growing 12 acres oats—

Rent of land, at \$3 per acre	\$36 00
Ribbing in autumn, 3 days at \$2.50	7 50
Cultivating in spring twice, 3½ days at \$2.50	8 75
⅓ manure, at rate of 15 tons per acre, \$1 per ton, applied in root year	36 00
Harrowing in spring, at 20c	2 40
Seed, 24 bushels at 50 cts	13 00
Sowing, 1 2-10 days at \$2.50	3 00
Rolling, 7-10 days at \$2.50	1 75
Cutting with binder, 1 4-10 days at \$2.50	3 50
Twine, \$4.80 ; use of binder, \$5	9 80
Shocking and cutting with scythes, 4 men, 1½ days at \$1.25	7 50
Loading and unloading, 6 men, 1 day	7 50
Drawing in, 2 teams, 1 day at \$2.50	5 00
Threshing, at 2½ cents per bushel, 724 bushels	18 10
Yield, 20 tons straw and 24,616 pounds, or 724 bushels, grain.	\$159 80

Cost to produce 1 ton grain	\$9 21
Cost to produce 1 bushel grain	15⅝ cts.
Cost to produce 1 ton straw	\$2 32
Cost to produce 100 pounds digestible dry matter, grain	73 cts.
Cost to produce 100 pounds digestible dry matter, straw	27 cts.

BARLEY.

Mensury.—5 acres were sown on what had been corn and sorghum land the preceding year. Sown May 2, matured in 92 days, August 2. Yielding 40 bushels, 38 pounds per acre. Measured bushel weighed 52 pounds.

Cost of growing 5 acres barley—

Rent of land, at \$3 per acre	\$15 00
Ribbing in autumn, 1¼ days at \$2.50	3 16
Cultivating in spring twice, 1¼ days at \$2.50	3 16
⅓ manure, at rate of 15 tons per acre, at \$1 per ton	15 00
Seed, 9¾ bushels, at 50 cents per bushel	4 87½
Sowing, ½ day at \$2.50	1 25
Rolling, 2½ hours, at 25 cents	0 63
Cutting with binder, ½ day	1 25
Twine, \$2 ; use of binder, \$2	4 00
Shocking, 2 men, ½ day	1 25
Hauling, 1 team and 4 men, 1 day	8 50
Threshing, 204 bushels, at 3½ cents per bushel	7 14
Yield, 90 tons straw, and 9,790 pounds, or 204 bushels, grain.	\$65 22

Cost to produce 1 ton grain	\$10 07
Cost to produce 1 bushel grain	24·1 cts.
Cost to produce 1 ton straw	\$1 83
Cost to produce 100 pounds digestible dry matter, grain	65·8 cts.
Cost to produce 100 pounds digestible dry matter, straw	20 cts.

PEASE.

Prussian Blue.—8 acres. This crop was grown on land that had been pastured for two years. It had been broken up early the preceding autumn. The seeding was done May 11, and the crop matured in 108 days, August 27. The growth of straw was heavy, but grain light, yielding 18¼ bushels per acre. Measured bushel weighed 63 lbs.

Cost of Growing 8 Acres of Pease.

Rent of land at $3 per acre	$24 00
½ manure, 15 tons to acre at $1	24 00
Ploughing in autumn at $2 per acre	16 00
Harrowing and cultivating in spring	7 50
Seed, 16 bushels at 80c	12 80
Cutting 1 day, team and 2 men	5 00
Drawing in, 2 teams and 4 men, 1 day	11 00
Threshing at 2½ cents per bushel, 147 bushels	3 68
Total	$103 98

Yield : 147 bushels grain or 8,820 pounds, and 20 tons straw.

Cost to produce 1 ton grain	$15 70
Cost to produce 1 bushel grain	47·1
Cost to produce 1 ton straw	1 73
Cost to produce 100 lbs. digestible dry matter, grain	90·2
Cost to produce 100 lbs. digestible dry matter, straw	21

MIXED CROP EXPERIMENT.

Side by side on the first year of the rotation field, that is on what had been pasture the preceding year, were sown 8 plots of 2 acres each, the aim being to get some data as to the comparative yields of crops grown as mixtures and as pure grains.

	Pounds of grain.
Plot 1, pure pease, yielded	2,202
Plot 2, pure barley, yielded	2,504
Plot 3, pure oats, yielded	4,119
Plot 4, mixture, barley 1 bushel, oats 1 bushel, pease 1 bushel, yielded	3,117
Plot 5, mixture, pease 1 bushel, oats 2 bushels, yielded	2,493
Plot 6, mixture, oats 1½ bushels, barley 1 bushel, yielded	2,915
Plot 7, mixture, wheat ½ bushel, barley ¾ bushel, oats 1 bushel, pease ¾ bushel, yielded	3,120
Plot 8, mixture, oats and pease equal parts by weight, yielded	1,341

It would be difficult to put a value on the straw from the various plots. Plot 8 gave a very heavy yield, of coarse long straw. The soil was in this case of a mucky nature.

MILLET.

A plot, 1 acre in area, was sown to domestic millet. The soil, a sandy loam, was rather wet, due to imperfect drainage. It had been in pasture the preceding year. The millet was sown broadcast, and made a fair growth. Sown June 15, it was harvested for hay August 24, and yielded 1 ton 920 pounds of dry fodder. After harvesting it made a fair growth on the stubble, but not sufficient to warrant cutting again.

MIXED HAY.

The hay crop was only fair this year, the total amount harvested being 140 tons. Below is a statement of the cost of growing 32 acres mixed hay :—

Rent of land at $3 per acre	$96 00
⅓ manure at 15 tons per acre, $1 per ton	96 00
½ seed at $1.50 per acre, 10 lbs. clover, 12 lbs. timothy	24 00
4 days' cutting at $2.50	10 00
2 days' teddering at $1.75	3 50
3 days' raking at $1.75	5 25
Rent of machines, oil, etc	4 00
Cocking 6 days at $1.25	7 50
Hauling in, 4 teams and 8 men, 1 day	20 00
	$266 25

Yield : 60 tons.

Cost to produce 1 ton hay	$ 4 45
Cost to produce 100 lbs. digestible dry matter	43·6

Clover Hay.

Cost to grow 7 acres clover :—

Rent of land at $3	$21 00
⅓ manure, 15 tons to acre, $1 per ton	21 00
½ seed, at $1.50 per acre, 10 lbs. clover, 12 lbs. timothy	5 25
1¼ days' cutting at $2.50	3 12
½ day teddering at $1.75	87
¾ day raking at $1.75	1 31
Rent of machines, etc	1 00
Cocking, 2 days at $1.25	2 50
Hauling, 3 teams and 4 men, ½day	6 25
	$62 30

Yield : 20 tons.

Cost to produce 1 ton	$3 12
Cost to produce 100 lbs. digestible dry matter	30·6

SORGHUM OR SUGAR CANE.

Sugar cane, Early Amber, 1 acre. The soil was sandy, of fair quality and received a dressing of barn-yard manure in the spring of 1895 of about 15 tons per acre. No fertilizer had been applied subsequently. The previous year it had been in pasture. The land was ploughed early in the autumn of 1899 about 4 inches deep, harrowed several times to keep down all growth, and cultivated the following spring and harrowed with the smoothing harrows before sowing. Sown June 16, with a force-feed seed-drill, in rows 3 feet apart; came up June 28.

The growth was very slow during July, owing to the large amount of rain. In August the crop made great progress, and stood about 10 feet high early in September. It was then cut and fed to dairy cattle and steers.

It is very seldom a good crop of sorghum is harvested in this section, owing to the great rainfall. A fairly dry June and July are essential to success with this grass.

CORN (*ZEA MAYS*).

Ten varieties were sown in areas ranging from ½ to 8½ acres, the aggregate being 30 acres.

Corn constituting part of the second year of the rotation, the soil was gang-ploughed the preceding autumn, a fair growth of clover being turned down, save where pease had been grown. Manure, at the rate of about 15 tons to the acre, was hauled out in the winter, left in small heaps and scattered as the frost was leaving the ground. The whole area was cultivated as frequently as weather would permit, until time to seed.

The sowing was done with a force drill in rows 42 inches apart.

The following particulars about the different varieties may be of interest:—

King of the Earliest.—2 acres soil, loam. Sown June 6. Cut for ensilage September 24, late dough stage. Yield, 13 tons 1,626 pounds per acre.

Giant Prolific Sweet Ensilage.—2 acres. Sown June 5. Cut for ensilage Septmeber 24. Very few ears. Yield, 16 tons 367 pounds per acre.

Selected Leaming.—4 acres. Sown June 1. Cut for ensilage September 22, late dough stage. Yield, 14 tons 1,325 pounds per acre.

Canada White Flint.—2 acres. Sown June 6. Cut for ensilage September 24, ripening. Yield, 11 tons 585 pounds per acre.

Early Mastodon.—2 acres. Sown June 6. Cut for ensilage September 24, dough stage. Yield, 14 tons 140 pounds per acre. This lot was on low land and was frozen to some extent.

Longfellow.—3 acres. Sown May 30. Cut for ensilage September 22, late dough stage. Yield, 17 tons 851 pounds per acre.

Mammoth Cuban.—3 acres. Sown May 30. Cut for ensilage September 23, dough stage. Yield, 13 tons 1,260 pounds per acre.

Clouds Early.—½ acre. Sown May 30. Cut for ensilage September 22, dough stage. Well eared. Yield, 9 tons 1,412 pounds per acre.

Whitecap Yellow Dent.—3 acres. Sown June 5. Cut for ensilage September 22, well-eared, dough stage. Yield, 10 tons 1,050 pounds per acre.

Selected Leaming.—8½ acres. Sown May 30 and cut September 14, very well-eared, late dough stage. The land on which this variety was grown was better drained than the area occupied by the other varieties, and so we may infer that the crop harvested off this area is representative.

The yield was 20 tons 235 pounds per acre, or 171 tons off the field.

Below is a summary of the cost of producing the finished ensilage from this area.

CORN (*ZEA MAYS*).

Selected Leaming.

Cost of growing 8½ acres of corn:—

Rent of land at $3 per acre	$25 50
Cultivating in autumn 5 days at $2.50	12 50
½ value of manure applied 15 tons at $1	25 50
Ploughing in spring at $2 per acre	17 50

Harrowing twice at 20 cents per acre................	$ 3 40
Seed 225 pounds at $1 per hundred..................	2 25
Sowing, team 1 day $2.50........................	2 50
Harrowing after sowing (twice) at 20 cents per acre......	3 40
Hoeing 17 days at $1.25........................	21 25
Cultivating with team 6½ days at $2.50..............	13 75
Cutting with machine 2½ days at $2.50..............	7 50
Loading and unloading, tramping, cutting 37 days......	46 25
Drawing in team 9 days at $2.50	22 50
Man at engine 3 days at $1.50....................	4 50
Use of engines and fuel and Ensilage cutter 3 days at $5..	15 00
Total cost	$213 30

Yielded, 171 tons corn in silo.

Cost $1.25 per ton in silo, or 3·75 cts. per bushel.

Average amount of dry matter per ton 375 lbs., (75 per cent digestible). Cost of producing 100 lbs. digestible dry matter, 44⅝ cts.

MANGELS.

Three varieties of mangels were sown. Sown May 13, harvested October 20.

Gate Post Red.—Two acres, yielded 31 tons 1,295 pounds, or 1,054 bushels 55 pounds per acre.

Giant Yellow Globe.—One acre, yielded 31 tons 1,960 pounds, or 1,066 bushels per acre.

Golden Tankard.—Twelve acres, yielded 30 tons 36 pounds, or 1,000 bushels and 36 pounds per acre.

The dry matter content of the varieties differ materially.

Variety.	Digestible dry matter in 100 lbs.	From 1 acre. lbs.
Gate Post Red....................	11·14	7,051·62
Giant Yellow Globe	8·19	5,238·87
Golden Tankard..................	10·25	6,153·43

These varieties were grown on land of a fairly uniform character, therefore difference in composition cannot be attributed to varieties in soil.

Below is cost of growing the above :

MANGELS.

Cost of growing 4½ acres mangels—

Rent of land at $3...........................	$13 50
Cultivating in autumn 4 times....................	7 50
½ cost of manuring 15 tons per acre at $1 per ton........	13 50
Ploughing in spring at $2......................	9 00
Harrowing twice 7 hours at 25 cents...............	1 75
Drilling 2 days at $2.50.......................	5 00
Rolling 3 hours..............................	0 75
Seed 13½ pounds at 20 cents....................	2 70
Sowing 2 days at $1.25........................	2 50

Hand wheel hoeing $5\frac{1}{2}$ days at $1.25	$ 6 88
Thinning 9 days at $1.25	11 25
Hoeing, 10 days at $1.25	12 50
Cultivating, single horse, 6 days $1.75	10 50
Pulling and topping 11 days	13 75
Drawing team 6 days $2.50	15 00
Loading and unloading 9 days $1.25	11 25
Total yield 143 tons.	$137 33

Cost of 1 ton mangels housed 96 cts., or 2·88 cts. per bushel.
Average dry matter per ton, 200 lbs. Cost of 100 lbs. digestible dry matter 48 cts.

TURNIPS.

Three varieties were grown with fair success. The soil was inferior to that under mangels inasmuch as it was not well drained. The plants made a uniform growth, but owing to the weather made a relatively greater top than root growth and so did not yield so well as might have been anticipated from looking at them growing.

Two acres sown later and on land better suited for this crop gave a greater yield by about fifty per cent.

Manure was applied during the spring and thoroughly incorporated with the soil. After being well cultivated the soil was drilled into ridges 2 feet apart. These were compacted by means of the land roller and seed-sown at the rate of 3 pounds per acre. The varieties with particulars concerning each are as follows :—

Skirving's Purple Top.—One acre, sown June 16, harvested November 2, roots small, yield, 17 tons 1,590 pounds per acre.

Champion Purple Top.—One acre, sown June 16, harvested November 2, roots rather small, yield, 18 tons 1,039 pounds per acre.

Rennie's Prize Purple Top.—Two acres, sown June 16, harvested November 2, roots small, yield, 17 tons 827 pounds per acre.

Analyses of samples of each variety grown this year, taken when the roots were being harvested show them to be practically equal in dry matter. The average percent of digestible dry matter being 10·49.

The following itemized statement of cost of production may be of interest.

TURNIPS (SWEDES.)

Rent of land at $3	12 00
Cultivating in autumn three times	7 50
$\frac{1}{2}$ manure, 15 tons per acre, valued at $1 per ton	12 00
Ploughing in spring at $2	8 00
Harrowing twice	1 62
Drilling 1 7-10 days at $2.50	4 25
Rolling $2\frac{1}{2}$ hours	63
Seed, 12 pounds at 20 cents	2 40
Sowing, 16 hours at $12\frac{1}{2}$ cents	2 00
Hand-wheel hoeing, 3 3-10 days	4 13
Thinning, 8 days at $1.25	10 00
Hoeing once, 6 days	7 50
Cultivating, single horse, 5 days at $1.75	8 75
Pulling and topping, 10 days at $1.25	12 50
Drawing, team 4 days at $2.50	10 00
Loading and unloading, 9 days	11 25
	$114 53

Total crop, 71 tons. One ton cost in root-house $1.63, or 4·89 cents per bushel. Cost of producing 100 pounds digestible dry matter, 77 cents.

CARROTS.

Three varieties of carrots were grown in half-acre lots side by side. The land was cultivated the previous autumn, ploughed in the spring and manured at the rate of 15 tons per acre. Particulars of the varieties are as follows:—

Mammoth White Intermediate.—½ acre. Sown May 16, harvested October 25. Yielded 27 tons 1,930 pounds or 932⅓ bushels per acre.

Improved Short White.—½ acre. Sown May 16, harvested October 25. Yielded 27 tons 1,160 pounds or 919⅓ bushels per acre.

Guerande or Ox Heart (Red).—½ acre. Sown May 16, harvested October 25. Yielded 24 tons 1,520 pounds or 825⅓ bushels per acre.

The white varieties gave the larger returns. The red contain more dry matter or food per ton, but do not keep so well. The white varieties give about 169·2 pounds digestible dry matter to the ton, while the red give about 233·0 pounds to the same quantity of roots.

Below is a statement of the cost of producing carrots.

Cost of Growing One and One-half Acres of Carrots.

Rent of land, 1½ acres, at $3	$4 50
Cultivating in autumn 4 times	2 25
Ploughing in spring at $2	3 00
½ manure, at 15 tons per acre, $1 per ton	4 50
Harrowing twice, 2½ hours at 25 cents	62½
Drilling, 5 hours at 25 cents	1 25
Rolling, 1 hour	25
Seed, 4½ pounds at 45 cents	2 02
Sowing, 5 hours at $1.25 per diem	63
Hand-wheel hoeing twice, at $1.25	2 50
Thinning, 5½ days at $1.25	6 88
Hoeing once, 2 days at $1.25	2 50
Cultivating single horse 4 times, 16 hours at 17½ cents	2 80
Ploughing team, 5 hours at $2.50	1 25
Pulling, topping and loading, 12 days at $1.25	15 00
Drawing in and unloading, 2 days at $2.50	5 00
	$54 95

Yield, 40 tons carrots. Cost, $1.37 per ton housed, or 4·11 cents per bushel.

Average dry matter per ton, 200 pounds. Cost of 100 pounds digestible dry matter, 68 cents.

SUGAR BEETS.

Two plots of sugar beets were grown. Vilmorin's White Improved was the variety selected.

To gain some information as to the comparative economy of growing sugar beets or mangels for feed, and to ascertain the relative cost of growing a given area (1) as for forage, (2) as for sugar, two plots of one-quarter acre each were grown side by side. The ground was prepared as for other root crops, and the same amount of barn-

yard manure was applied. In thinning for forage, plants were left 8 inches apart, but for sugar, 4 inches apart. The hoeing, cultivating, &c., of the two plots was the same for some time, but when a fair growth had been made, that is, when the plants were about two months old, those intended for forage were treated as mangels, that is, the upper part of the root left exposed, while those intended for sugar were hilled up, the whole root and crown thereof being covered.

Th yield per acre was nearly the same from the two plots, being at the rate of 21 tons 640 pounds from the forage and 20 tons 1,060 pounds from the sugar plot.

The digestible dry matter content of the roots from the two plots differed materially, namely, 22·50 pounds of dry matter in 100 pounds of roots in the case of roots intended for sugar, and 18·74 pounds of dry matter in 100 pounds of roots intended for forage.

Below is the cost of producing sugar beets (*a*) for sugar (*b*) for forage :—

(*a*).—BEETS (FOR SUGAR.)

Cost of growing one-quarter acre sugar beets for sugar—

Rent of land, at $3	$0 75
Cultivating in autumn	0 37½
¼ manure, at 15 tons per acre, valued at $1 per ton	0 75
Ploughing in spring	0 50
Harrowing	0 10
Drilling	0 33
Rolling	0 05
Seed, 3 pounds at 20 cents	0 60
Sowing, 1 hour	0 12½
Hand-wheel hoeing, 2½ hours	0 33
Thinning, 11 hours	1 38
Hoeing, 7 hours	0 87½
Cultivating, single horse	1 05
Ploughing out roots, 1 hour at 25 cents	0 25
Pulling and topping, 12 hours at 12½ cents	1 50
Drawing in roots, 3 hours	0 75
Loading and unloading, 10 hours	1 25
	$10.96½

Yield on one-quarter acre, 10,265 pounds.

Cost of producing 1 ton	$2 14
Cost of producing 1 bushel	6·42 cts.

Digestible dry matter in 1 ton, 450 pounds.

Cost of 100 pounds of digestible dry matter	48 cts.

(*b*.)—BEETS (FOR FEED.)

Cost of growing one-quarter acre sugar beets for feed—

Rent of land, at $3	$0 75
Cultivating in autumn	0 37½
¼ manure, at 15 tons per acre, valued at $1 per ton	0 75
Ploughing in spring	0 50
Harrowing	0 10
Drilling	0 33

Rolling	\$0 05
Seed, 3 pounds at 20 cents	0 60
Sowing, 1 hour	0 12½
Hand-wheel hoeing, 2½ hours	0 33
Thinning, 9 hours	1 13
Hoeing, 6 hours	0 75
Cultivating, single horse, 6 hours at 17½ cents	1 05
Ploughing out roots, 1 hour	0 25
Pulling and topping, 10 hours	1 25
Drawing in roots, 2½ hours	0 63
Loading and unloading, 8 hours	1 00
	\$9 97

Yield on one-quarter acre, 10,660 pounds.

Cost of producing 1 ton	\$1 87
Cost of producing 1 bushel	5·61 cts.

Digestible dry matter in 1 ton, 375 pounds.

Cost of 100 pounds of digestible dry matter	50 cts.

RAPE (*Brassica Napus*).

As the question of cheap pork production assumes greater proportions in view of our rapidly growing bacon trade, forage plants peculiarly suited for pigs must certainly come to the front. It is well known that the pig thrives on grass or green feed alone, but the importance and necessity of feeding him on such is very often overlooked. Another consideration frequently neglected is the comparative value of different forage plants for the end in view. The conditions governing the feeding operations, however, enter into this matter, and frequently such crops as can be most conveniently produced or utilized must take precedence over others better adapted to the end in view.

Of the various crops more or less extensively cultivated for pig feed during the past two years, none other has given quite such satisfactory results as rape. The variety best suited for forage is Dwarf Essex.

During the past year about 4½ acres have been under rape. The plots have been cultivated as follows:—

Plot 1.—This plot, 1½ acres in extent, was a slightly loamy sand. It was manured 15 tons to the acre in May, and the rape sown in drills 30 inches apart on May 19. This crop grew very rapidly and yielded in August 28 tons green fodder to the acre. A second crop grew up and gave about 3 tons to the acre.

Plot 2.—This plot, 1¼ acres in area, was a good loam. It was manured 12 tons to the acre in June and sown in drills 30 inches apart, June 16. In August it cut 22 tons to the acre, and the land was then ploughed.

Plot 3.—This plot, ¼ acre in area, was sown broadcast on June 18.

The plot had been used as a pig pasture the preceding summer, so no manure was necessary. This plot was used as a pasture for store pigs.

Plot 4.—This plot, three-sixteenths of an acre in area, was sown in drills 30 inches apart. It was used as pasture for pigs.

Plot 5.—This plot, 1½ acres in area, was sown on sod, ploughed July 16. No manure was added, but the best seed bed possible under the circumstances was pre-

pared, and the plot sown July 23 partly in drills 18 inches apart and partly broadcast. The land being rather dirty and in a poor state of tilth, this plot did not do very well. The part sown broadcast was a very light crop indeed. The part sown in drills did very much better, however, as it was possible to cultivate by means of the hand-wheel hoe.

Plots 1 and 2 were cut and used as soiling crops for steers, calves, pigs and sheep. It was impossible to get any idea of the exact feeding value from the animals fed. The steers, ten in number, averaged 1,000 pounds weight and made gains at the rate of 2 pounds per diem each while on the rape, no grain being fed.

A lot of ten steer calves were given a good feed daily and appeared to enjoy the juicy leaves and stems very much, and to thrive thereon.

The pigs to which it was thrown in small quantities daily ate it with avidity, and were quite evidently much benefited by the same.

Sheep were allowed to feed upon lot 5, and ate it down quite close. As soon as turned upon the rape, they began to improve in flesh.

Lambs pastured on a part of lot 1 did well for some time, but did not seem to thrive so well after a few weeks. The rape, however, was not at fault, I think.

The greatest value of the crop would appear to be as a pasture for pigs.

A study of six pigs put to pasture on lot 4, August 14 last, is most interesting. The data obtained is as follows:—

LOT OF SIX PIGS ON RAPE PASTURE.

No. of Pig.	Weights.							
	Aug. 14.	Aug. 28.	Sept. 11.	Sept. 25.	Oct. 9.	Oct. 16.	Oct. 30.	Dec. 6.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
279	61	76	80	85	96	108	129	175
280	60	73	80	95	105	121	147	195
281	64	73	91	103	111	127	150	201
282	60	73	90	99	109	120	143	171
283	60	72	82	99	114	135	157	203
284	53	68	76	90	105	118	141	182
Total	358	435	499	571	640	729	867	1,127
Total gain	....	87	64	72	69	89	138	260
Daily rate of gain in lbs	....	1·03	0·76	0·85	0·82	2·12	1·64	1·20
Daily grain ration	....	1	1½	1¾	2	3	4	5

STATEMENT of cost of proceeds of the above lot of six pigs :—

To 6 pigs at $3	$18 00
3-16 acres rape at $14.17 per acre	2 66
2,067 lbs. meal at 90c. per cwt	18 60
Gross cost	$39 26
By 1,127 lbs. pork at $6 per cwt	$67 62
Profit on lot	28 36
Profit per pig	4 73

From a study of the habits of the pigs pasturing on plot 4, I should say that the best results would be secured by sowing the rape in rows 24 to 30 inches apart at the rate of about 3 pounds of seed (Dwarf Essex) to the acre. When thus sown this can be cultivated by horse-power when young, and has a tendency to branch out and develop a large leaf crop rather than go to stem.

It is most interesting to watch the niceness of discrimination exercised by your practised rape-eating pig, as he strolls leisurely down the row and selects the juicy leaves that best please his fancy. I have observed too, that your trained pig is equal to the best of chemists in picking out those parts of the plant most valuable for food. He soon learns to shun the large or old leaves, and feasts upon the young, the tender, the juicy. A study of the chemistry of the plant will be found in the report of Mr. F. T. Shutt, Chemist of the Experimental Farms.

Below is a statement of the cost of producing the forage :—

Cost of Growing One Acre of Rape.

Rent of land	$3 00
Cultivating in autumn	1 50
Ploughing in spring	2 00
½ manure applied at rate of 20 tons per acre and valued at $1 per ton	4 00
Harrowing twice	0 50
Seeding 1½ hours	0 37
Seed, 3 lbs. at 10c	0 30
Hoeing 3 times, 2 days at $1.25	2 50
	$14 17

Yielded 30 tons.

Cost of producing 1 ton	47 cents
Average dry matter per ton	200 lbs.
Cost of 100 lbs. dry matter	23½ cents

PUMPKINS.

Part of the second year of the rotation area was devoted to pumpkins. The portion selected was adjoining the autumn pasture for convenience in feeding. The soil was a sandy loam, and fairly well drained. Manure was first applied at the usual rate of 15 tons per acre, worked into the soil. The plot was then thoroughly cultivated and harrowed. It was marked off into 8-foot squares, and a small hole about 18 inches square and 6 inches deep excavated at each corner. This was filled about half full of barnyard manure (scrapings), a layer of earth thrown over it, and the seeds planted in this layer.

The plants grew apace, and in a short time covered the whole area. Much fruit developed, and grew to a fair size. The yield from the half acre being 1,250 pumpkins, averaging 14½ pounds, or about 9 tons.

These were fed partly to the dairy cattle, which seemed to do well upon them. A large number were fed to pigs. One lot fed on raw pumpkins did fairly well, making a gain of 745 pounds in 107 days, at a cost of $3.08 per 100 pounds gain. They ate 2,090 pounds pumpkins and 1,981 pounds meal half corn, half oats, pease and barley equal parts.

Another lot of 6 pigs, fed on cooked pumpkins, did exceedingly well, making 706 pounds increase in 99 days, at a cost of $2.96 per 100 pounds gain. They ate 7,500 pounds pumpkins and 1,602 pounds meal.

Cost of Production.

Rent, ½ acre, at $3 per acre	$1 50
Cultivating in autumn	80
Ploughing in spring	1 00
Harrowing twice	20
Rolling	10
Manure, ½ of 7½ tons, at $1 per ton	1 50
Seed, 10 cents, and seeding, $1.70	1 80
Hoeing, 1 day	1 25
	$8 15

Total yield, 18,125 pounds. Cost of producing 1 ton, 90 cents.

One ton contains about 190 pounds digestible dry matter. Cost of producing 100 pounds digestible dry matter is 47 cents.

THE JERUSALEM ARTICHOKE *(Helianthus tuberosus.)*

A plant that is attracting some attention as yielding a plentiful supply of succulent and apparently rather nutritious food for pigs is the Jerusalem artichoke. Its value would, however, appear to be lessened by the great length of time required to mature the tubers or even produce them in any considerable bulk at the base of a plant.

A plot one sixteenth of an acre (10 square rods) in area was sown May 19, with about 70 pounds of tubers. They were planted 4 inches deep, in rows 24 inches apart and in hills about 20 inches apart in the rows. They required but little cultivation, as they soon grew so dense as to kill all other or less vigorous forms of plant life. The growth of the plant for about three months was confined to the stem, leaves and roots alone, no appreciable development of tubers being observable. In September young tubers made their appearance and slowly developed.

On October 3 only small tubers about the size of hen's eggs were found on digging, although the plants had made a most luxuriant growth, standing 10 to 13 feet high, and about 50 per cent of them being in flower.

Although the tubers were immature, it was decided in view of the lateness of the date to turn the pigs in at once. Accordingly on the above mentioned date six crossbred pigs were turned free in the lot. They were allowed 1½ pounds of meal each per diem in addition to the artichokes, which they rooted out most industriously and ate most greedily. I have never seen pigs eat anything with more gusto.

The following table will give some idea of the progress made by this lot of pigs while on artichokes and so of the value of artichokes as a supplementary food for pigs:—

No. of Pig.	Weight, Oct. 3.	Weight, Oct. 24.	Gain.	Daily rate of Gain.	No. of Pig.	Weight, Oct. 3.	Weight, Oct. 24.	Gain.	Daily rate of Gain.
	Lbs.	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	Lbs.
263	100	131	31	1·47	269	109	145	36	1·71
264	105	141	36	1·71	271	95	127	32	1·52
267	106	138	32	1·52					
268	111	141	30	1·42	Total	626	823	197	1·57 Average

The daily average of 1·57 pounds is remarkable in pigs of such live weights, but becomes still more worthy of consideration when we remember the small amount of grain fed per diem.

During the twenty-one days the 6 pigs consumed 189 pounds of meal (½ corn, ½ oats, pease and barley equal parts), at 90 cents per cwt., $1.70, while the meat produced valued at current prices ($6.25 per cwt.), was worth $12.31, leaving a balance of $10.61 for the sixteenth of an acre of artichokes. Putting this in another way we have 197 pounds pork produced at a cost as follows :—

189 pounds meal at 90 cents		$ 1 70
One-sixteenth acre artichokes cost for seed	$ 0 50	
For planting, &c	1 00	
Rent, $5 per acre	0 35	
		1 85
Net cost		$ 2 55

That is one pound of pork produced at a cost of 1·8 cents.

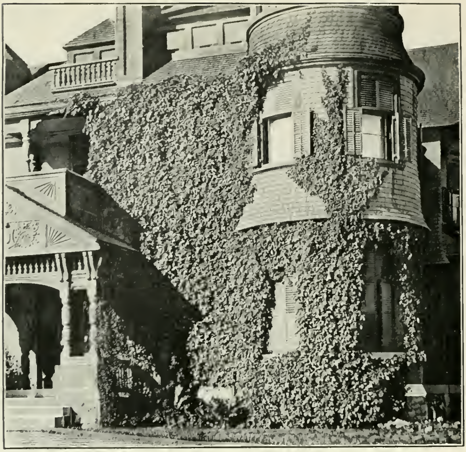
This tuber may be sown in the autumn and will then start to grow early the next year, or the crop may be left unharvested till the ensuing spring and the pigs allowed to root them out as soon as the frost comes out.

SUMMARY.

The following tables of cost of production of (1) a ton of stored forage or threshed grain, and (2) 100 pounds of digestible dry matter are submitted with the end in view of showing the comparative cost of producing each if not generally at least in one instance :—

Number.	(1). Cost of producing 1 ton of stored forage or threshed grain in the form of :	$ cts.	(2). Cost of producing 100 pounds of digestable dry matter as yielded by :	cts.
1	Rape	0 47	Barley straw	20
2	Pumpkins	0 90	Pea straw	21
3	Mangels	0 96	Rape	23·5
4	Corn (ensilage)	1 25	Oat straw	27
5	Carrots	1 37	Clover	30·6
6	Turnips	1 63	Mixed hay	43·6
7	Pea straw	1 73	Corn (ensilage)	44·4
8	Barley straw	1 83	Pumpkins	47
9	Sugar beets (for forage)	1 87	Sugar beets (for sugar)	48
10	" (for sugar)	2 14	Mangels	48
11	Oat straw	2 32	Sugar beets (for forage)	50
12	Clover	3 12	Barley	65·
13	Mixed hay	4 45	Carrots	68
14	Oats	9 21	Oats	73
15	Barley	10 07	Turnips	77
16	Pease	15 70	Pease	90.2

In speaking of the comparative cost of the above, both as stored material and as digestible dry matter, it is not attempting to differentiate their feeding values. It will not of course be understood that because a certain forage is produced at a small cost it will pay to feed or grow only that variety. Frequently when a form of digestible dry matter can be produced cheaply it is of a character to necessitate the addition of some more expensive material before being fed. An example of such a case would be afforded by barley straw which produced digestible dry matter at a cost of 20 cents per 100 pounds, which if fed exclusively would result in practically starving the animal, while a small addition of pea meal would make the ration a fairly good one.



Self-fastening Virginia Creeper growing on house of Director Central Experimental Farm.

Part of Apple Orchard, Central Experimental Farm, showing cover crop of Red Clover.

REPORT OF THE HORTICULTURIST.

(W. T. Macoun.)

Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit, herewith, the fourteenth annual report of this division. While space will not permit of going fully into the details of all the experiments which were conducted during the past year, nor of treating any one subject at great length, the aim has been, in preparing the following report, to present a summary of most of the work undertaken by the Horticulturist, and to give the results of such experiments as it was thought best to publish this year.

Character of Season.—The climate of the Ottawa Valley is, as a rule, very favourable to the production of such fruits as will endure the winters, and the weather this year was not exceptional in that respect. The atmospheric conditions which usually prevail in the valley seem to be such as to prevent any long continued drought in summer, and thus it is not often that there is too little rain. The winters are long and rather severe, but there is generally a good covering of snow to protect low growing plants and the roots of trees. The weather was very changeable last winter, there being no long spells of cold nor of mild weather. Up to March 1, there had not been more than from ten to twelve inches of snow on the ground at one time. During the third week of January nearly all the snow that was then lying on the ground disappeared. On March 1, 18 inches of snow fell, and on the following day 6 inches more. This came in a very opportune time, protecting the roots of the trees at a critical period of the year. The coldest day of the winter was on February 2, when the temperature fell to 21·5° F. below zero.

The snow gradually disappeared after the middle of March, but as there were few warm rains or little rain of any kind, the frost did not leave the ground readily and the spring was backward. The frost was out of the ground enough to use the spade on April 19, although it could still be found in spots for several weeks afterwards. Compared with last year, the opening of spring work was only one day later.

The weather remained quite cool until May 13. On the 10th and 11th of that month there were four and five degrees of frost respectively, but as there had been little growth up to that time very little injury was done. On May 14 the weather became quite warm, the temperature rising to 86° F. This was the first day that growth was at all rapid. While this rise in temperature was followed again by cool weather, the last week of the month was quite warm, the temperature being 81° F., 82° F., and 83° F., on the 26th, 27th and 28th. No frosts occurred after the 11th. June was a very favourable month for plant growth, their being sufficient rain to keep everything growing well. Most of the month of July was showery, but there were few storms and the weather, though warm at times, was never hot. August was also a favourable month for plant growth. On the 6th, the temperature was 90° F., and on the 26th, 91° F., these being the hottest days of the month.

September was an exceptionally fine month, until the third week, which was wet, the temperature, as a rule, being mild or warm. There was a light frost on the 19th, but only the melons were injured. The highest temperature of the year occurred on the 2nd, when it rose to 93·8° F. October began with fine weather in much the same way as September had ended, and there was no killing frost until the 17th, when the

leaves on the grape vines were killed and the fruit injured. Such tender things as cannas and dahlias were also destroyed. The temperature on that day was 27·8° F. Much fine weather followed, and there was no more severe frost until November 13, when the temperature fell to 15° F. On the 14th, four inches of snow fell and remained, although, as the weather becoming mild, nearly all the frost came out of the ground, and more snow following, there was practically no frost in the ground up to the end of the month. Winter set in much earlier than usual this year.

Fruit Crop.—The past season was favourable to most fruits, the yield and quality, on the whole, being good. Many varieties of apples produced good crops, and as the trees have now been planted for twelve years, the quantity of fruit picked from them this year was considerable, some trees producing from 2½ to 3 barrels. Only a few pear trees fruited, as there are not many trees of a bearing age in the orchard, most of them having been killed by winter or blight from time to time. The crop of American plums was very good, and some of the newer varieties are quite promising. As with pears, very few trees of the European varieties of plums were old enough to bear, as these are killed out by the winter from time to time. The cherry crop was practically a failure, for, although some of the trees bloomed very well, little fruit set. Grapes did comparatively well, but not as much fruit set as usual. They were very slow in ripening, and if there had been early frosts few varieties would have matured. As it was, however, 81 kinds ripened, the fruit being of good quality, but not as well flavoured as when it ripens rapidly. The strawberry crop was exceptionally good and the picking season longer than usual. As prices for strawberries were high in Ottawa this year, local growers must have found them very remunerative Raspberries also did well, and the quality of the fruit was good. Currants were not as good as usual ; and although the American gooseberries did well, the European varieties produced very little fruit, as mildew was bad. The latter might have been controlled somewhat by spraying the bushes with potassium sulphide, but only the new plantation was sprayed.

PROGRESS OF THE WORK.

Owing to the favourable season this year, nearly everything made satisfactory progress in the horticultural department.

The work of top grafting the tenderer varieties of apples on hardy stocks was again a prominent feature of the work in the early spring.

During the winter, in the spring, and again in the autumn, experiments were conducted in spraying apple trees with a lime mixture to determine the best formula to use for the destruction of the oyster-shell bark-louse, which it had been found possible to remove by this means.

Cover crops have received special attention in this department during the past season, as in 1898 and 1899, the importance of having some covering in the orchard during the winter to protect the roots of the trees being fully recognized. Of all the cover crops tested here there is none as satisfactory as Mammoth Red or Common Red Clover.

Valuable data are being accumulated every year on the hardiness, productiveness, and quality of a large number of different kinds of fruits, and this year being a favourable one for fruits much information was gained, especially regarding varieties which had never fruited before.

There has not yet been found a hardy, late-keeping variety of apple suitable for growing for commercial purposes in northern and eastern Ontario and the Province of Quebec, which equals in quality, productiveness and appearance the best varieties grown in the more temperate parts of the provinces. A large number of seedlings of the best hardy apples which have fruited at the Central Experimental Farm have been grown, and will be planted out next spring, and it is hoped that in time, from

such seedlings and from cross breeding, that some good, late-keeping, hardy sorts will be obtained.

Few of the European plums are sufficiently hardy to be grown profitably in such a cold climate as that at Ottawa, and on this account special attention has been given to the improved American plums, no pains having been spared to make the collection of varieties as complete as possible. The American plums are being very rapidly improved, and some of the best of those which have fruited here are so good that it is hard to believe they have developed from the wild type.

This autumn, part of the Russian orchard, in which the trees had not made satisfactory growth, was drained, and it is expected that the land will be very much improved and the trees succeed better in the future.

Experiments with vegetables were again carried on this year to a considerable extent, in order that information might be obtained which would assist the vegetable grower as well.

The Arboretum and the Botanic garden looked well this season, as there was sufficient rain to keep things fresh and green all summer. As the trees and shrubs develop, they become more interesting and attractive. A large number of additions were made to the collection again in the spring.

The perennial border had a good show of bloom from early spring until late autumn.

Large collections of seeds were received this year from various arboreta and botanic gardens, and many new things have been obtained in this way.

The correspondence, as usual, has occupied much time, but as this is one of the few ways in which the knowledge gained can be imparted to the public, the time devoted to it is well spent.

Meetings attended and Places visited.—During the past year meetings were attended and addresses given at nine different places. On February 20 and 21, I attended the winter meeting of the Quebec Pomological Society at Granby, Que., and gave an address on 'The Development of Spraying in Canada.' By arrangement with the secretary of the Ontario Fruit Growers' Association, addresses were given before seven of the horticultural societies affiliated with it, my subjects being 'The Lawn and Garden,' and 'The Flower and Fruit Garden.' These meetings were held at Napanee on March 12, Port Hope on March 13, Cobourg on March 14, Trenton on March 15, Picton on March 16, Stirling on March 18, and Belleville on the 19th. I attended the annual meeting of the Ontario Fruit Growers' Association, on December 19, 20 and 21, and delivered addresses on 'Results of Experiments in Growing Fruit at the Central Experimental Farm,' and 'Garden Favourites.'

During the month of June, I visited the Grimsby district and Niagara peninsula, and at Niagara examined the trees which had been sprayed with lime mixture the previous winter. The months of July and August were spent in Great Britain, Ireland, and at the Paris exposition, and while not absent on official business I endeavoured to learn as much as possible of the horticultural conditions in the places visited, and brought home much information which will be helpful to me in my work.

Acknowledgments.—It is again a pleasure to acknowledge the assistance which has been kindly furnished me by a large number of fruit growers throughout Canada. The knowledge which I have gained by this friendly co-operation has enabled me to be of much greater service to the fruit growers, generally, than I otherwise would be. Fellow-workers in the United States have also furnished me with much valuable information.

As I was absent about two months last summer in the old country, the responsibility of carrying on the work of the horticultural division fell on Mr. J. F. Watson, secretary, and Mr. H. Holz, foreman. I was very gratified on my return to find that the former had kept the correspondence and other work in the office in good order,

and that the latter had spared no pains to keep everything running smoothly and satisfactorily outside.

DONATIONS.

Sender.	Donations.
Annis, A. E., Dryden. Ont	Native pine and spruce trees.
Archambault, Jos., St. Lin, Que	Apple scions.
Arnold Arboretum, Jamaica Plains, Mass	Seeds of trees and shrubs.
Aylmer Pump Co., Aylmer, Ont	Barrel spray pump.
Beaman, E. C., Newcastle, Ont.	Scions of 14 varieties of pears.
Botanic Gardens, Saharunpore, N. India	Collection of seeds.
Brodie, R., Montreal, Que	Sciôns of Sunset Russet apple and Isham crab apple.
Carruthers, Jas., Magundy, N.B	Potatoes.
Carter, J. H., Massawippi, Que	Scions of Pomme de Fer apple.
Chapais, J. C., L'Lslet, Que	Plum scions.
Craig, Prof. John, Ames. Iowa	Apple scions.
Curry, S. L., Weldon, Iowa	Scions of Curry plum.
Dempsey, W. H., Trenton, Ont	Samples of fruit ; apple scions.
Elm City Nursery Co., New Haven, Conn	1 tree Hinman Peach; 1 Meeker cherry tree.
Ferguson, A., Port Morien, C.B., N.S	Potatoes.
Gow, J. E., Windsor. Ont	Plant of prickley pear cactus.
Hamilton, R., Grenville, Que.	Scions of Blair and Childs' crab apples.
Hansen, Prof., Brookings, S.D., U.S	Scions of Odegard plum.
Imperial Botanic Gardens, St. Petersburg, Russia	Collection seeds.
Johnston, Asa, East Farnham, Que	Scions of Bethel apple.
Johnstone, John, Long River, P.E.I	Native spruce trees.
Jones, Harold, Maitland, Ont	Seedling pear trees.
Jones & Conard, New Grove, Pa	Plant New Century rose.
Lamb, Jas., Walkerton, Ont	Potatoes.
Matheson, D., Ottawa, Ont	Grape cuttings.
Newman, C. P., Lachine Locks, Que	Scions of 2 seedling apples.
Oren, J. K., Brandon, Iowa	13 Oren plum trees.
Peterson, P. S., & Son, Chicago, Ill	Cuttings of trees and shrubs.
Pitcher, Rev. J. T., Smith's Falls, Ont	Lily bulbs.
Reid, W. C., Belleville, Ont	Two trees of Akin red apple.
Robson, W. E., Minden, Ont	Scions of Jesmona apple.
Royal Botanic Gardens, Kew, England	Willow cuttings ; collection of seeds.
Shepherd, R. W., Como, Que	Scions of Red Canada and Switzer apples.
Snaison, R. A., Uxbridge, Ont	Potatoes.
Snelling, W. H., New Edinburgh, Ont.	Two seedling plum trees.
Snow, C. H., Cummings Bridge, Ont	Strawberry plants.
Starr, R. W., Wolfville, N.S	Plum trees and hardy roses.
Stevenson, A. P., Nelson, Man	Scions of Peerless apple.
Strachan, Alex., Southampton, Ont	Potatoes.
Tait, David, Iron Bridge, Ont	Scions of Kirkland apple and Warner pear.
Todd, F. G. Montreal	Six large specimens of *Rhododendron maximum.*
Trotter, Miss L., Owen Sound, Ont	Pear scions.
Walker, Jos., Strathroy, Ont	Scions of unknown apple.
Webster, F. Ashbrook, Arbroath, Scotland	Rose bushes.
Wile, S., Branch la Have, N.S.	Potatoes.
Young, C., Richards Landing, Ont	Scions of Charlamoff apple.

I have the honour to be, sir,
Your obedient servant,

W. T. MACOUN,
Horticulturist.

APPLES.

The trees in the apple orchard continue to make good growth, on the whole. Every year, however, some of them die, and the proportion of deaths is greatest among the oldest trees, which have now been planted twelve years. The varieties which suffer most are those of Russian origin, Duchess of Oldenburg, especially, being one of the number. The trees are usually blown down by storms, and on examination it is found that most of the roots, and nearly all the wood in the trunk, is rotten. Duchess of Oldenburg is considered one of the hardiest varieties of apples grown, but the trees are probably weakened by overbearing. Some of the Russian apples are growing in soil which has not been hitherto thoroughly drained, and this may be one of the causes of their early death. The Duchess trees however, are growing in the best soil in the orchard. Another cause of death may be that the roots, having nearly all been killed by winter in some previous year, did not supply sufficient sap to the tree, and hence it died or blew down because there were not enough roots to hold it in place. There is considerable evidence to show that this is one of the principal causes of death. In former years some of the trees were badly affected with blight, many large branches having been removed. It is possible that this disease remained in parts of the trees and caused decay to set in. There has not been very much blight (until this year), and very little root-killing since 1896, and the trees planted since that time are doing well. It very often happens, however, that trees which are quite healthy when young, soon die when they begin to bear heavily.

There was practically no root-killing of apple trees last winter, as there was a good covering of snow during the latter part of the winter, and an excellent cover crop of red clover in the orchards, and in some parts, Alfalfa clover. As has been the custom during the past three seasons, the clover was cut and let lie on the ground to rot. Owing to other pressing work, it was not possible to cut it the first time just as the flower heads were beginning to show, and it was in full bloom before it was mown, the result being that the plants were considerably weakened, and only four good crops were cut instead of five, which has been the case in the past. If then this system is adopted, the clover should be cut before the flowers are developed, if the best results are to be obtained.

A large number of trees bloomed well this year, but a smaller proportion of fruit set than is usual from the same amount of bloom. On examining some flower buds after the severe frosts of May 10 and 11, it was found that the pistils of those which were most advanced were, in many cases, destroyed, hence the frost had something to do with the fruit not setting as well as usual. The result, however, of the crop being thus lessened was that the apples were of much better size than if the trees had been heavily loaded. There have been 645 varieties of apples grown in the orchards and nurseries, and 193 varieties fruited this year.

The trees were thoroughly sprayed with Bordeaux mixture and Paris green as usual ; the early varieties receiving four applications, and the later ones five applications. There was no scab, and comparatively little fruit was injured by codling moth. It is now believed that the oyster-shell bark-louse can be kept well under control by spraying the trees with lime and water. The conclusions reached thus far being that two applications are sufficient. The best mixture has been found to be 2 pounds of lime to 1 gallon of water. Fuller directions for the use of this mixture will be found elsewhere. There were very few caterpillars this year, and no difficulty was found in killing what few there were.

The greatest injury to the trees was caused by fire blight. This began in the second week of June and continued throughout the summer. Very few trees, however, were badly injured, as in most cases only the smaller branches were affected, these being killed back from one to three feet, as a rule. In the Russian orchard, where most of the Russian varieties are, and where the blight made such ravages in 1895, the injury was comparatively small. In the standard orchard, however, where some of

the Russian varieties are planted, the Tetofsky was badly blighted, the fruit spurs, which are very prominent on this variety, being nearly all destroyed. Of twenty-seven trees none escaped. The Wealthy also suffered considerably, though none of the trees were badly injured. The berried or Siberian crab (*Pyrus baccata*), was affected worse than any of the named varieties, some trees being completely killed. No preventive or any other satisfactory remedy has been found for this disease. The usual practice is to cut off the branch about a foot below the affected part as soon as the blight is noticed.

The work of top grafting the tenderer varieties of apples was continued this year. Unfortunately, a large proportion of the grafts set this year were destroyed by blight during the summer. Most of the trees grafted in 1898 and 1899, however, are doing well. None of them have yet been killed back by winter.

Apple growing as far north as Ottawa, and in a similar climate, is attended with many vissicitudes, and there is much yet to be learned regarding this important industry before one may be fairly certain of having trees live to be a good age.

PEARS.

Little success has attended the efforts made to grow pears at the Central Experimental Farm. It is true that a few of the Russian varieties live to be eight or ten years old, but blight comes suddenly and destroys them. These pears are also very inferior in quality and are really not worth growing where better pears can be bought cheaply on the market.

Up to this year, the young pear trees in the orchard had grown well since 1896, having not been affected by blight in 1897, 1898 and 1899, and it was thought that perhaps it would not appear again for some time, but this year the trees were affected again and by the time the summer was over many were dead, while others were killed back more or less badly. A tree of Flemish Beauty, planted in 1890, has been bearing lightly since 1897, and appears quite hardy. It was not affected by blight this year to any extent. Scions have been taken from this tree and grafted, and it will be interesting to learn whether the young trees will prove hardy and free from blight or not. This work will be continued, different stocks used, and other methods of grafting adcpted, in the hope that a hardy strain of this fine pear will be obtained. The Longworth pear, which was originated in Iowa, is a very hardy variety and has proved free from blight here. A fair crop of fruit was produced this year, but it is of inferior quality. Season, September.

PLUMS.

The trees in the plum orchard continue to do well. There was a good crop of American plums, and fifty-eight varieties bore fruit this year. A few of the European plums fruited also.

The European and Japanese plums are so uncertain in climates as severe as that at Ottawa that they should not be planted for commercial purposes, unless the orchard has good protection, and even in that case there are but few that would give satisfaction.

It is necessary, therefore, to fall back on the American plums, and as these are being improved very rapidly by selection and by cross-breeding, and are perfectly hardy, they offer a strong inducement to plant plums for profit where the European or Japanese varieties will not produce paying crops. Men who have been growing these plums for some years in the vicinity of Ottawa are obtaining good prices for the these plums may be had from the last week of August, until the last week of September.

Although there are several species of American plums, only two of them furnish most of the varieties that are profitable to grow in Ontario and Quebec.

The species found in eastern Canada is *Prunus nigra*, Ait., the type of which is distinguished easily at a glance from *P. americana*, Marsh, in being darker in the bark and with a much stiffer and more upright habit than the latter. The fruit of *P. nigra* ripens, as a rule, earlier than that of *P. americana*, and is usually more evenly covered with red. Some varieties are good in quality, but, as a rule, are not as high flavoured as those of *americana*. This species, however, varies considerably and sometimes it is difficult to decide whether a variety is *P. nigra* or *P. americana*. The trees bear heavily and regularly, but if they are not kept thoroughly sprayed the fruit becomes affected with plum blight, and withers and falls before becoming ripe. The species called *P. americana* is not known to occur in Canada, although the form of wild plum growing in Manitoba is much like it, but is intermediate in some characteristics between the two. Its range is from New Jersey to Montana. The named varieties which have sprung from this species comprise most of the best kinds now offered for sale. This tree grows from 10 to 20 feet in height, is of spreading habit and is usually quite hardy where the native species grows. It bears heavily and regularly, as a rule, and the fruit of the best varieties is of good size and attractive appearance, and, although not equal in quality to the best European plums, is juicy, sweet, often high flavoured, and at all times refreshing. The skin is sometimes more or less acrid, but this is not apparent when eating some of the best varieties, although when canned or preserved, it sometimes develops, though often it does not. *P. americana* does not suffer from blight to any extent, and this is an important reason why varieties of it should be planted instead of *P. nigra*, unless the trees are properly sprayed.

The following technical descriptions of the two species, made by Waugh, give their distinguishing characteristics in greater detail and accuracy:—

'*P. americana*, Marsh.—Common Wild Plum. The type distinguished by entire calyx lobes, which are pubescent on the inner surface; stone turgid; leaves oval or slightly obovate; petioles mostly without glands. Tree spreading, ragged, thorny, 8 to 20 feet high; flowers large, white, on slender pedicels; leaves very coarsely veined, never glossy or shining; fruit more or less flattened upon the sides, firm and meaty, the skin tough and glaucous and never glossy, ripening through yellow to red. Occurs wild from New Jersey and New York to Montana and Colorado. It varies southward, in Texas and New Mexico represented mostly by the variety *mollis*.

'Var. *nigra*. Canada Plum, Red Plum (*P. nigra*, Ait., *P. americana* T. & G. and 6th ed. Gray's Manual.) In its extreme forms easily distinguished by the glandular-serrate calyx lobes, glabrous on the inner surface; compressed stone; broadly oblong-ovate to obovate leaves with petioles bearing two glands. Flowers large, white, with short thick peduncles conspicuously marked by the scars left by the falling of the bud scales; pedicels dark red, slender, glabrous; calyx tube broadly obconic, dark red on the outer and bright red on the inner surface; fruit oblong-oval, orange-red; stone nearly oval, compressed. Occurs wild from Newfoundland west to Rainy and Assiniboine rivers in Canada, and commonly in the New England States, where it is found along roadsides and in waste places.'

The plum has been well studied by Prof. F. A. Waugh, of Burlington, Vt., and through his work the fact has been established that practically all varieties of American plums are self-sterile. In other words, there would be no fruit in an orchard containing a number of trees of one variety only, unless the wind or insects carried pollen of other varieties to fertilize the flowers. This knowledge is of great importance to the fruit grower. It is another indication that 'nature abhors perpetual self-fertilization.' While a variety is self-sterile in itself, if it is fertilized by another self-sterile variety, fruit will be formed, and vice versa. It is necessary, then, if good crops are to be obtained, to have more than one variety growing in the orchard, to have the varieties bloom at the same time, and to have them of the same species, if possible; and, failing that, to have the species as closely related as possible.

At the Central Experimental Farm there are now 76 varieties of American plums, a large proportion of which have fruited, and following are descriptions of the best of them, with names of the varieties which may be used as pollenizers to fertilize them:—

Aitkin, *nigra*.—Ripe August 22, 1899, and August 24, 1900. Fruit large, oval, suture merely an obscure line; colour uniformly deep red all over; flesh deep yellow, juicy, sweet, but not rich nor high flavoured; stone large, flat, semi-cling; skin rather thin, tough and astringent. Quality above medium. Tree a vigorous upright grower and a medium bearer. As grown here, the only good points in this plum are its earliness and attractive appearance; but earliness is a very desirable characteristic, and it is worth planting on this account. Cheney, however, which follows it in ten or eleven days, is so much better in every way, and for home use, especially, that it is much to be preferred.

Cheney, *nigra*.—Ripe September 2, 1899, September 4, 1900. Fruit large, oblong to roundish, suture distinct; colour uniformly purplish-red all over; flesh deep yellow, juicy, sweet, rich; stone of medium size, flat, cling; skin moderately thick, tough, without astringency. Quality good. Tree upright, vigorous, and a good bearer. This and Bixby are the two best early plums which have fruited here, and they should both be planted.

Bixby, *americana*.—Ripe August 31, 1899, September 6, 1900. Fruit large, round; colour yellow, more or less covered with red; bloom rather heavy; flesh deep yellow, juicy, sweet, rich; stone of medium size, almost free; skin thick but tender and without astringency. Quality very good. Tree spreading, vigorous, and a heavy bearer. This is the earliest good plum of the *americana* group which has fruited here. It is well worth growing on account of its earliness, productiveness and quality. It does not ripen its fruit as early as some nor is it very firm, but on the whole it is a good plum.

Gaylord, *americana*.—Ripe September 6, 1899, September 13, 1900. Fruit almost large, roundish, somewhat heart-shaped, suture distinct; colour yellow, almost covered with deep red, with a bloom; flesh deep yellow, juicy, sweet, rich; stone of medium size, free; skin moderately thick and fairly tender; slightly astringent. Quality good. Tree spreading, vigorous, and a good bearer. A fine plum.

New Ulm, *americana*.—Ripe September 11, 1899, September 18, 1900. Fruit large, nearly round, somewhat heart-shaped, suture distinct; colour yellow, more or less covered with pink or purplish-red, sometimes the surface has a mottled appearance when the yellow shows through the red; bloom moderately heavy; flesh deep yellow, juicy, sweet; stone of medium size, cling. Skin thick and tough, but not astringent. Quality good. Tree vigorous, of a low, spreading habit, and a good bearer. This is a firm plum, and should prove a very useful sort for shipping.

Wolf, *americana*.—Ripe September 14, 1899, September 18, 1900. Fruit large, roundish to oval; suture fairly distinct; colour uniformly dull deep-red all over; bloom moderately heavy; flesh deep yellow, juicy, sweet, rich; stone large, cling; skin thick and tough, and but slightly astringent. Quality good. Tree somewhat spreading, vigorous, productive. The Wolf as grown at the Central Experimental Farm is different from that described by most writers; one great difference being that the one grown here has a cling stone. There is no other plum in our collection, however, which resembles it, hence the name will not be changed for the present. It is one of the very best of the American plums. The Wolf described by others is also said to be one of the best. When it fruits here the two will be compared.

City, *americana*.—Ripe September 14, 1899, September 18, 1900. Fruit large, round; suture distinct; colour yellow, almost covered with red, but not of a very

attractive shade; bloom moderately heavy; flesh yellow, juicy, sweet; stone of medium size, free; skin thick, moderately tender, slightly astringent. Quality good. Tree low growing, spreading, vigorous and productive. The fruit of this variety is firm, and should ship well. It is spoken highly of elsewhere also.

SILAS WILSON, *americana*.—Ripe September 18, 1900. Fruit very large, roundish; suture distinct ; colour yellow, more or less mottled with purplish-red ; bloom moderately heavy ; flesh yellow, juicy, sweet, rich ; stone above medium size, semi-cling ; skin moderately thick, fairly tender, not astringent ; quality very good. Tree spreading, vigorous. This is the first year that this variety has fruited here, but if it is productive it should prove one of the most valuable. It is the largest and best in quality of all the American plums which have yet fruited here.

STODDARD, *americana*.—Ripe September 19, 1899, September 18, 1900. Fruit very large, almost round ; suture distinct ; colour yellow, almost covered with purplish or coppery red ; bloom moderately heavy ; flesh yellow, juicy, sweet, rich ; stone large, cling ; skin thick, but moderately tender, not astringent. Quality very good. Tree vigorous, spreading and moderately productive. On account of its size, appearance and quality, this is one of the best of this class of plums. Next to Silas Wilson, it is the best in quality of those which have fruited here.

HAWKEYE, *americana*.—Ripe September 22, 1900. Fruit large, roundish; suture distinct ; colour deep purplish-red ; bloom heavy ; flesh deep yellow, juicy, moderately rich ; stone large, flat, cling ; skin thick and tough, but not astringent. Quality good. Tree vigorous, spreading, productive. This variety resembles Stoddard very much, but is not as good in quality. It is, however, a very valuable sort.

WYANT, *americana*.—Ripe September 19, 1899, September 22, 1900. Fruit very large, irregular, roundish, somewhat flattened ; suture distinct ; colour yellow, but well washed and mottled with dull deep red ; bloom moderately heavy; flesh yellow, fairly juicy, sweet ; stone large, free ; skin moderately thick and tough, astringent ; quality medium. Tree vigorous, spreading. Has not proved productive here, but has elsewhere.

AMERICAN EAGLE, *americana*.—Ripe September 22, 1900. Fruit large, roundish, somewhat oval ; suture distinct ; colour deep purplish-red ; bloom moderately heavy ; flesh yellow, juicy, sweet ; stone of medium size, cling ; skin thick and tough, not astringent. Quality good. Tree vigorous. This is the first year that this variety has fruited here, but it promises to be a very useful sort. It is spoken of highly by others.

HAMMER, *hortulana*.—Ripe September 25, 1899, September 27, 1900. Fruit large, roundish ; suture distinct ; colour dark, dull red ; bloom heavy. The bloom brightens up this variety and gives it a very attractive appearance. Flesh deep yellow, juicy, sweet, with the peculiar flavour of the Miner plum ; stone medium in size, semi-cling ; skin thick and tough. Quality good. Tree vigorous, spreading, productive. This variety extends the season of the American plums very considerably. It has one drawback in the fact that it cracks easily. It is a hybrid between *Prunus americana* and *P. hortulana*, and on this account is hardier than if it were pure *hortulana*. Where a late plum is desired, this is a good variety to plant.

There are some other varieties which have been highly spoken of, and which, although being tested here, have not yet fruited. Among these may be mentioned Odegard (recommended for its extreme earliness), Legal Tender, Oren, Brittlewood, Terry, Smith and Kieth. The Surprise plum, which is said to be one of the best, if not the best, in quality, may not be hardy enough for the coldest parts of this country, as it is of the *hortulana* group, but it is said to be one of the hardiest of that group.

VARIETIES OF PLUMS AND THEIR POLLINATORS.

Cheney, Gaylord, New Ulm, Silas Wilson, City, will pollinate one another.

Bixby, Wolf, Stoddard, Haweye, Wyant, American Eagle, Hammer will pollinate one another.

Aitkin has no good pollinator among the other varieties recommended, as it is a very early bloomer, Cheney, which comes nearest being one, is not in full bloom until six days later.

GRAPES.

In the annual report of the horticulturist for 1896, the grape was treated of at considerable length. There the methods of propagation, planting, cultivation, training and pruning the vines were well described. The various fertilizers for use in the vineyard were also mentioned. Recommendations were made on the thinning, spraying, picking and packing of the fruit, and a table published giving descriptions of the varieties tested at the Central Experimental Farm, with date of planting, origin, vigour, and date of blooming and date of ripening, colour and yield of fruit. Notes were also published on the relative value of the different varieties for wine or dessert purposes.

The information given in the report for 1896 is just as valuable now as it was then, and it is, therefore, not necessary at present to again describe the culture of the grape in full. As the horizontal arm system there described is probably the best one to adopt in those parts of Canada where the grape is not grown on a commercial scale, and where the vines have to be covered with soil every winter, the description of that method, which was published in 1896, is herewith given again, with such additional notes as are thought necessary :—

Horizontal System.—'This method of training is especially adapted to sections of the country where it is advisable to give the vines winter protection. Two strong canes are trained in opposite directions. The laterals springing from these are trained perpendicularly. In the autumn the laterals are cut back to two spurs. When the spurs become weak they are renewed, as is an entire arm, occasionally. This system calls for a four-wired trellis, in order to properly tie the strong laterals.'

As the vines have to be bent down and covered with soil every winter to protect them, more emphasis should be laid on the necessity of renewing the arms from time to time. When the arms get large and stiff they are hard to bend, and more soil is required to cover them. Furthermore, the buds become weak on old arms, and after a time do not grow at all, except at the outer extremity, so that it is very important to renew them as soon as anything of this kind is apparent. A good crop of fruit will be produced on arms of the previous season's growth if the root from which they spring is more than two years of age. It is important also when starting the arms to get them from within a foot of the ground. If there is a high stub it is so much more difficult to cover.

It is difficult to describe the summer pruning of the vine, but experience will soon teach what is necessary. It will be found that more laterals will grow than are desired to bear the crop which is wanted. These should be pinched out. Suckers will also grow, which should likewise be destroyed, as should all side-shoots from the laterals which are bearing the fruit. The main object in thus thinning out the vines is to allow the fruit to get plenty of sunshine.

The vines are protected in winter by simply bending them down and covering them with enough soil to hold them in place.

The season of 1900 was not very favourable for grapes at Ottawa, although 81 varieties matured at the Experimental Farm, but they were not as good in quality as in some years. It was very showery all summer, and this caused a greater growth of

vine than was best for the proper development and ripening of the fruit. While there were no early frosts in autumn to injure the vines or fruit, the weather was not warm enough to induce rapid ripening, and on this account the grapes were not as sweet as they sometimes are.

Red clover seed was sown in the vineyard on July 21, and a good cover crop was formed by autumn. This will help to hold the snow and afford a better protection to the roots of the vines. It will also be useful for ploughing under in the spring. This autumn, the work of renewing the old arms was continued, most of them having now been treated in this way.

As it is important to know what varieties of grapes are likely to ripen every season in places where only the earliest sorts will mature, the following table is given, in which will be found fifteen of the very earliest sorts growing at the Central Experimental Farm. These varieties have been obtained by selecting them from the earliest twenty-five of the past three years. The year 1898 was very favourable for the ripening of grapes. The year 1899 was just the reverse, September being cool and wet and severe frosts coming early. This year it was intermediate between the other two as, while no severe frosts occurred until late, the weather was not warm enough to cause the fruit to ripen rapidly. The varieties, then, which have ripened earliest in all of the past three years, should be certain to ripen almost every year.

LIST OF FIFTEEN OF THE EARLIEST VARIETIES OF GRAPES.

Name.	Date of Ripening.	Date of Ripening.	Date of Ripening.	Average date of Ripening.	Colour of Fruit.	Size of Fruit.	Quality of Fruit
	1898.	1899.	1900.	1898-1900.			
Florence..	Sept. 2..	Sept. 7..	Sept. 10..	Sept. 7..	Black ...	Above medium..	Poor.
Champion.......	" 3..	" 17..	" 18..	" 13..	" ...	" " ..	"
Pattison..... ..	" 6..	" 23..	" 12..	" 14..	" ...	Medium	Medium.
Moore's Early ..	" 6..	" 21..	" 24..	" 17..	" ...	Above medium..	Above medium.
Moyer....... ...	" 6..	" 23..	" 25..	" 18..	Red......	Below " ..	Good.
Golden Drop....	" 10..	" 17..	" 26..	" 18..	White..	Small.... . .	Above medium.
Peabody..	" 6..	" 23..	" 28..	" 19..	Black .. .	Below medium..	" "
Canada.........	" 10..	" 23..	" 26..	" 20..	"	Small..	" "
Telegraph	" 12..	" 23..	" 26..	" 20..	"	Above medium..	" "
Brant	" 13..	" 22..	" 26..	" 20..	"	Small	" "
Belvidere.......	" 10..	" 25..	Oct. 4..	" 23..	"	Medium........	" .
Early Victor....	" 10..	" 27..	" 2..	" 23 .	"	"	Medium.
Cottage.........	" 10..	" 27..	" 4..	" 24..	" . . .	Above medium..	Above medium.
Marion.........	" 13..	" 29..	Sept. 29..	" 24..	" .	Below medium..	Medium.
Janesville	" 13..	" 23..	Oct. 5..	" 24..	" ...	Medium	"

It will be noticed that only one of these varieties is of good quality but, as has already been stated, these varieties are mentioned not for their quality but for their earliness. By referring to the reports of the horticulturist for former years, descriptions will be found of other and better sorts, but which are not quite so early. The Cambell's Early grape which will probably prove a valuable early variety has not yet fruited here and comparisons cannot yet be made with it.

RASPBERRIES.

A bulletin was published on the raspberry in 1895, in which the culture of this fruit was discussed and descriptions of many varieties given. Since that time, comparatively little has been published on this subject, the principal reason being that owing to the very unfavourable weather a large number of the bushes which comprised a plantation put out in the autumn of 1896, failed to grow. As the old plantation had been destroyed after the new one was made, there was no stock to draw from

to fill in the vacancies until sufficient plants were grown. For this reason there had not been sufficient data to publish until this year, when a large number of the varieties became in a condition to admit of reliable results being obtained. In tho following table will be found the yields of the different varieties for the past season. A large number of these are cross-bred, and seedling sorts originated by Dr. Wm. Saunders, and this is the first year that comparative results have been published of them and the older named varieties. Some of the former are very productive and will probably, in time, take their place among the best varieties that are grown. The yields are, as a rule, from 12 bushes, planted in a row 36 feet long.

RASPBERRIES—TEST OF VARIETIES.

Name of Variety.	Date of First Ripe Fruit.	Date of First Picking.	Date of Last Picking.	Total Number of Pickings.	Total Yield.		Length of Row.	Remarks.
Red Varieties.					Lbs.	Oz.	Ft.	
Kenyon	July 14	July 16	Aug. 13	12	32	2	36	Large, firm, deep red, medium quality.
Henry	" 4	" 13	" 6	11	28	1	36	Above medium size, soft, good quality.
Brighton	" 7	" 13	" 9	10	27	2	36	Medium size, good quality.
Clarke	" 11	" 13	" 13	13	26	15	36	Large, deep red, good quality.
Count	" 7	" 13	" 9	12	26	13	36	Large, quality above medium.
Marlboro	" 9	" 13	" 13	13	24	9	36	Medium size, medium quality.
Muriel	" 8	" 13	" 9	11	22	10	36	Mediumsize, quality above medium.
Phœnix	" 9	" 16	" 17	13	21		36	Large, firm, medium quality.
Boyle	" 9	" 16	" 9	10	20	1	36	Medium size, medium quality.
Red Antwerp	" 11	" 13	" 9	11	16	12	36	Medium size, good quality.
Turner	" 11	" 13	" 13	13	16	7	36	Above medium, soft, good quality.
Herbert	" 11	" 13	" 13	12	15	14	36	Large, good quality.
Reliance	" 7	" 13	" 13	13	15	13	36	Medium size, poor quality.
Cassel	" 12	" 18	" 13	9	15	2	36	Above medium size, medium quality.
Garfield	" 11	" 16	" 13	12	15	2	36	Medium size, medium quality.
Lorne	" 7	" 13	" 13	12	14	11	36	Mediumsize, quality above medium.
Cardwell	" 10	" 16	" 9	10	14	11	36	Medium size, quality medium.
Nelson	" 11	" 13	" 9	11	14	3	36	Large, firm, quality above medium.
Trusty	" 6	" 13	" 13	12	13	7	36	Below medium size, soft, good quality.
Alma	" 11	" 13	" 13	12	12	15	36	Small, soft, poor quality.
Thompson's Early Prolific	" 9	" 13	" 13	13	12	10	36	Medium size, good quality.
Hornet	" 11	" 16	" 13	11	12	5	36	Medium size, medium quality.
Cardinal	" 12	" 20	" 13	9	12	4	36	Size above medium, medium quality.
King	" 7	" 13	" 17	14	11	3	36	Medium size, medium quality.
Craig	" 12	" 16	" 13	12	10	11	36	Above medium size, good quality.
Cuthbert	" 15	" 20	" 17	11	10	11	36	Large, firm, good quality.
Loudon	" 12	" 16	" 17	13	10	10	36	Large, good quality, not equal to Cuthbert.
Hansell	" 6	" 13	13	13	10	9	36	Medium size, good quality.
Heebner	" 12	" 18	" 13	11	10	6	36	Large, very good quality.
Herstine	" 12	" 18	" 9	8	8	7	36	Large, soft, good quality.
Biggar's Seedling	" 13	" 18	" 13	11	8	5	36	Below medium size.
Fontenoy	" 12	" 16	" 17	11	7	5	36	Large, soft, good quality.
Miller's Seedling	" 9	" 13	" 13	13	7	1	36	Medium size, medium quality.
Gladstone	" 7	" 13	July 27	6	6	9	36	Small, soft, good quality.
Deacon	" 12	" 18	Aug. 9	9	5	10	36	Medium size, medium quality.
Dora	" 12	" 18	" 1	5	5	6	36	Large, good quality.
Sir John	" 7	" 16	" 6	7	4	12	36	Medium size, good quality.
Baumforth	" 9	" 13	" 6	5	2	10	36	Large.
Empire	" 6	" 13	July 18	3	2	9	36	Medium size, medium quality.
Mary	" 16	" 18	" 25	4	2	5	36	Above medium size, good quality.

RASPBERRIES—TEST OF VARIETIES—*Continued.*

Name of Variety.	Date of First Ripe Fruit.	Date of First Picking.	Date of Last Picking.	Total Number of Pickings.	Total Yield. Lbs.	Total Yield. Oz.	Length of Row. Ft.	Remarks.
Yellow Varieties.								
Caroline	July 16	July 20	Aug. 16	11	16	1	36	Medium size, medium quality.
Yellow Antwerp	" 12	" 16	" 9	8	11	4	36	Above medium size, good quality.
Golden Queen	" 16	" 23	" 13	9	8	1	36	Large, good quality.
Champlain	" 11	" 16	" 3	8	4	14	36	Large, soft, good quality.
Lady Anne	" 12	" 16	July 27	4	3	14	36	Medium size, medium quality.
Purple Varieties.								
Shinn	" 12	Aug. 13	" 13	13	27	8	36	Medium size, firm, quality above medium.
Duncan	" 14	" 18	" 13	10	18	15	36	Large, firm, quality above medium.
Shaffer	" 12	" 20	" 13	10	11	10	36	Large, good quality.
Ralph	" 16	" 20	" 9	8	8	7	36	Medium size, firm, good quality.
Percy	" 10	" 16	" 6	9	8	2	36	Large, firm, good quality.
Columbian	" 18	" 23	" 13	9	7	7	36	Resembles Shaffer, but milder and firmer.

RASPBERRIES GROWN IN LARGER PLANTATIONS.

Cuthbert (Red)		July 18	Aug. 16	12	92	7	236	Large, firm, good quality.
Sarah "		" 20	" 13	9	67	7	236	Large, firm, late, very good quality.
Heebner "		" 18	" 16	12	43	2	236	Large, bright red, very good quality.
Golden Queen (Yellow)		" 20	" 16	11	45	8	236	Large, yellow, good quality.
Progress (Black Cap)		" 14	" 13	11	84	5	236	Medium size, black, juicy, good quality.
Hilborn "		" 18	" 13	12	71	14	236	Medium size, black, juicy, very good quality.
Older "		" 15	" 9	10	47	3	236	Large, black, juicy, good quality.
Shaffer (Purple)		" 18	" 16	12	72	12	236	Large, purple, good quality.

CURRANTS.

The currant crop was not good this year. The bushes suffered considerably during last winter, and in the spring it was found that much of the bearing wood was dead. They have, however, made good growth this season, and a fair crop should be obtained next year. A new plantation will be started in the spring, as most of the old bushes have been planted since 1893, and by the time the new ones are in full bearing it will be time to root the old ones out.

The table giving the names of varieties with yields, &c., which was published last year, is again repeated with the yields of this year, and the average yield of the past three years included.

CURRANTS—TEST OF VARIETIES.

CURRANTS—RED.

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Total Yield for 1900.		Average Yield per bush 1898.		Average Yield per bush 1899.		Average Yield per bush 1900.		Average Yield for three years.	
		1899.			Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Red Dutch	1893	July 7.	Small to medium	6	39	4	6	10	12	5	6	9	8	8
Raby Castle	1893	" 9.	" "	6	34	15	4	10	10	6	5	13	6	15
Red Grape	1893	" 8.	Above medium	6	16	15	5	1	10	13	2	13	6	4
Greenfield	1893	" 9.	Medium to large	6	20	8	7	9	7	3	3	7	6	1
London	1893	" 11.	Large	6	28	6	5	14	6	3	4	12	5	10
Early Scarlet	1893	" 7.	Medium	6	29	8	5	7	4	15	4	15	5	2
La Conde	1893	" 7.	"	4	8	8	4	10	6	7	2	2	4	6
Cherry	1893	" 8.	Small to medium	6	19	3½	4	4	4	1	3	3	3	13
North Star	1893	" 7.	Above medium	6	25	12	3	0	3	9	4	5	3	10
Wilder	1893	" 8.	Large	6	19	4	4	13	2	8	3	3	3	8
Ribes Striatum	1893	" 16.	Small	6	13	8	0	12	4	1	2	4	2	6
Prince Albert	1893	" 10.	Large	6	13	0	2	3	1	2	2	3	1	13
Fay's Prolific	1893	" 10.	Very large	6	3	3	0	12	2	10	0	8	1	5
Versaillaise	1893	" 7.	"	5	4	3	2	2	0	4	0	13	1	1
Simcoe King	1896	" 9.	Large	4	8	12	...	...	0	13	2	3	...	...
Moore's Ruby	1893	" 10.	"	3	1	10½	...	...	0	2	0	9	...	...
Cumberland Red	1896	" 8.	"	3	1	9	...	...	4	3	0	8	...	...
WHITE.														
Climax	1893	July 10.	Large	6	28	8	3	15	3	10	4	12	4	2
White Grape	1893	" 10.	"	6	4	4	3	15	1	7	0	11	2	0
White Dutch	1893	" 8.	Medium	6	3	12	0	12	2	1	0	10	1	2
BLACK.														
Kerry	1893	July 14.	Above med. to large	6	20	2	5	4	7	9	3	6	5	6
Ontario	1893	" 14.	Medium to large	6	17	8	3	7	9	4	2	15	5	3
Eagle	1893	" 12.	Med. to above med.	6	13	5	4	4	8	9	2	3	5	0
Ethel	1893	" 13.	" "	6	10	10	5	8	4	5	1	12	3	14
Climax	1893	" 14.	Above med. to large	6	5	2	4	0	6	6	0	14	3	12
Clipper	1893	" 14.	Medium to large	6	17	8	2	8	5	10	2	15	3	11
Success	1893	" 9.	Large	6	16	4	1	14	5	14	2	11	3	8
Stewart	1893	" 14.	Small to medium	6	7	4	4	15	3	15	1	3	3	6
Perry	1893	" 16.	" "	6	6	5	2	2	5	14	1	1	3	0
Orton	1893	" 10.	Large	6	4	12	3	0	4	11	0	13	2	13
Winona	1893	" 12	Above medium	6	5	5	2	5	4	15	0	14	2	11
Monarch	1893	" 14.	Medium to large	6	3	8	2	10	4	11	0	9	2	10
Charmer	1893	" 13.	Small to medium	6	2	6	4	2	3	0	0	6	2	8
Eclipse	1893	...	Medium to large	6	...	...	3	3	3	11	...	...	2	5
Prince of Wales	1893	" 14.	Small to medium	6	1	3	3	15	2	7	0	3	2	3
Beauty	1893	" 12.	Medium to large	6	2	1	2	5	3	12	0	5	2	2
Lee's Prolific	1893	" 13.	Medium	6	4	12	...	...	5	3	0	13	2	..
Standard	1893	" 12.	Large	6	5	2	2	12	2	4	0	14	1	15
Black English	1893	" 12.	"	6	2	15	2	2	2	14	0	8	1	13
Dominion	1893	" 12.	Medium	6	3	14	2	9	2	0	0	10	1	12
Ogden	1893	" 12.	"	5	2	1	2	9	2	1	0	7	1	11
Stirling	1893	" 14.	"	6	1	3	2	6	1	14	0	3	1	8
Mattie	1893	...	Medium to large	6	...	...	3	2	1	2	...	...	1	7
Star	1893	" 14.	Medium	6	5	3	1	2	1	9	0	14	1	3
Lewis	1893	" 12.	Small to medium	5	5	15	0	10	0	3	1	3	0	11
Black Naples	1893	" 14.	Medium to large	5	0	9	0	15	2	6	0	2	1	2
Oxford	1893	...	Above medium	6	...	...	1	6	0	8	...	...	0	10
Perth	1893	...	Medium to large	6	...	...	0	10	0	13	...	...	0	8

The following varieties have been planted within the last three years :—

CURRANTS—RED.

Name.	Year Planted.	Date of Ripening.	Size of Fruit.	Number of Bushes.	Total Yield for 1900.		Average Yield per Bush 1899.		Average Yield per Bush 1900.	
					Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Moore's Seedling	1898	July 8	Very Large	5	6	12	0	2	1	6
Benwell	1898	" 8	Medium	6	5	2	0	⅓	0	14
Goliath	1898	" 8	"	6	4	10	0	2	0	12
Victoria Red	1898	" 7	"	6	4	9	0	⅓	0	12
Defiance	1898	" 9	"	6	2	14	0	¼	0	8
Houghton Castle	1898	" 8	"	5	2	8	0	⅓	0	8
La Fertile	1898	" 8	Large	6	2	12	0	½	0	7
Knight's Large	1897	" 9	"	4	1	12	0	5	0	7
Wentworth Seedling	1898	" 9	Medium	5	2	4			0	7
Pomona	1897	" 7		6	2	0			0	5
Large Bunch Holland	1897	" 9		4	1	1			0	4

CURRANTS—WHITE.

White Imperial	1897	July 10	Large	6	9	4	1	7	1	9
Wentworth Leviathan	1898	" 9	Medium	6	2	14	0	¼	0	8
Transparent	1868	" 9	"	6	1	9	0	1	0	4

CURRANTS—BLACK.

Victoria Black	1898	July 18	Very Large	6	8	5	1	1	1	6
Baldwin	1898	" 14	Above Medium	6	6	8	0	3	1	1
Black Grape	1898	" 18	Large	6	4	6	0	6	0	12
Buddenborg's Black	1898	" 16	Very Large	6	3	14	0	4	0	10
Imay's Prolific	1898	" 12	Med. to above Md.	6	3	0	0	11	0	8
Black Prince	1898	" 14	Large	6	0	13	0	3	0	2
Collin's Prolific	1899									

GOOSEBERRIES.

The gooseberries in the new plantation which was made last year, made good growth this season, the growth of the American varieties being, however, much greater than that of the European. The American varieties should begin to fruit next season.

STRAWBERRIES.

The strawberry is the most popular small fruit that is grown in Canada, one reason being that enough luscious berries to supply the family needs may be grown on a very small area of land, and hence, it is possible for a large number of people to grow strawberries. Because of its popularity, many questions are asked regarding the best varieties to plant and the best methods of cultivation.

Already two bulletins (No. 5 and No. 27) have been published at the Central Experimental Farm on the strawberry. So great has been the demand for these publications that the supply of both is exhausted. In order that those who have not these bulletins, nor any other information on strawberry culture, may know the chief factors in growing strawberries successfully, the subject is again briefly discussed herewith.

SOIL.

To grow strawberries successfully, the soil should be well drained. The kind of soil is not, as a rule, more important than the drainage of it. Warm soils, such as sandy loam, will produce early fruit, but the yields will not always be as large as on clay loam. Much, however, will depend on the richness of it. Soil which will grow good crops of roots will grow good strawberries. In any case, a soil should be chosen which does not bake naturally or which by thorough tillage may be brought into such good condition that it will not bake.

PREPARATION OF THE SOIL.

Soil should be chosen, if possible, that has been prepared, in a measure, by growing a crop of roots which have been heavily manured. After the roots or other crops have been removed in the autumn, the land should be stirred deeply, it being the best practice to use a subsoil plough after the ordinary kind for this purpose. By using the subsoil plough the soil may be loosened to the required depth without bringing the subsoil to the surface, which would probably be the case if it were ploughed very deep with the ordinary plough. Clover sod land, ploughed in the autumn, is also good, as the sod furnishes humus. In the spring the soil should be brought into a fine state of tilth with the harrows, and where it is thought best, it may be ploughed beforehand. A heavy dressing of manure, from 20 to 30 tons per acre should be applied to the land, either the previous year or in the spring. If it is applied in the spring, it should be thoroughly rotted and well incorporated with the soil. Fresh manure applied in the spring renders the soil too open, and the strawberry plants do not start to grow readily. The roots also are liable to dry up and the plants die. It is difficult to plant strawberries unless the manure is well rotted and mixed with the soil.

As no after top-dressing will be equal to manure ploughed under some time before the plants are set out, it is very important, where manure can be had, to make the ground rich beforehand. Thorough preparation of the soil is one of the most important matters in strawberry culture.

PLANTING.

Successful planting may be done either in the spring or autumn. Spring, however, is the most satisfactory time, as if the plants are set then, when the soil is in good condition, they will make rapid growth and many runners during the summer, if properly looked after, and produce a full crop of fruit the following season.

Planting, however, should be done while the soil is still cool and moist. If planted in the autumn, there will, as a rule, only be a light crop of fruit the following season, and unless the weather is favourable when the plants are set, and the soil is moist, there may be very little growth indeed. If planting is done in the autumn, it should be as soon as the plants can be obtained with sufficient roots and when the soil is moist.

The most satisfactory method of growing strawberries on a large scale in Canada is by what is known as the matted-row system. The plants are set from 12 to 15 inches apart in rows from 2½ to 3½ feet apart. If proper cultivation is given, there should be no trouble in having a matted row of plants 18 inches to 2 feet in width by autumn. Planting may either be done by opening a hole for the plant by bending a spade backwards and forwards in the soil and then setting the plant in it and tramping it in with the foot, or by using a trowel. The latter method will usually give the better results, as the roots can be spread when planting, and the plants have much better conditions for growing. Great care should be taken to have

the crown of the plant just at the surface of the ground after it has been pressed in when planted. If it is too high, the results will be bad; and if too low, not much better.

CULTIVATION AND FORMING THE MATTED ROWS.

As the future crop will depend on the number and strength of the runners, it is very important to encourage rapid growth from the very start. Cultivation should begin as soon as possible after the plants have been set, and the surface soil should be kept quite loose and free from weeds until the cultivator interferes with the runners. The early cultivations should be deep, in order to loosen the soil in which the roots are to grow, and the after cultivations should be quite shallow, so as not to injure the roots. Hoeing will be necessary, occasionally, in order to destroy all weeds and loosen the soil close to the plants. Any blossoms which appear during the first season should be pinched off, and all the first runners should be destroyed, either with the cultivator or hoe. This is to make the parent plants as strong as possible before the runners which are to remain begin to grow. About the middle of July, or as soon as the strawberry season is over, the runners should be allowed to develop and take root. It will be found that some varieties form many, and some only a few. If very many are formed, they should be thinned out to from 3 to 6 inches apart, in order that the crowns may develop properly. The width of the rows will depend on the runners which are made. There should, however, be a path from 1 to 2 feet wide kept between the rows for the pickers to stand in.

HILL SYSTEM.

Large berries may be obtained by growing the plants in what is known as the 'Hill System.' The plants are set from 12 to 15 inches apart, in rows about 2 feet apart; the blossoms are kept pinched off the first season, as in the other system, and no runners whatever are allowed to form. By this method a very strong crown is developed; the plants, having more room, become very vigorous, and as a result, the fruit is much larger, and often as good crops are obtained as from the matted-row system. The plants should be protected in winter as when grown in the matted row. In the spring the crowns should be uncovered, but the mulch left on. This will help keep the soil moist and the fruit clean. If injury from heaving in winter is likely to occur, this system will not prove very satisfactory. There is also more labour connected with it than with the other.

WINTER PROTECTION.

After permanent frost has set in and the ground is quite solid, the plants should be covered with a light coat of clean straw, that which will not pack closely over the plants being the best. This will prevent the alternate thawing and freezing of the ground in the spring and protect the plants, if there is not much snow in the winter. While plants will often come through the winter without protection, it is best not to take any risks. After the frosty weather of early spring is over and before the plants begin to grow, they should be uncovered and the straw put between the rows to keep the fruit clean. As soon as the fruit has been picked, the straw should be removed altogether, the plantation weeded and the surface soil loosened with the cultivator, so that the runners may have a chance to root.

RENEWING THE PLANTATION.

If there is sufficient land available, the most satisfactory results will be obtained by only taking one crop off a plantation. It can easily be arranged to have one part

always in full bearing. It is quite possible to obtain two good crops, and this is often done where it is not convenient to make a new plantation every year. But the older the plantation, the less the crop will be, as a rule. The fruit will also be smaller and weeds will become very plentiful.

FERTILIZERS.

As a rule the strawberry crop is greater and the fruit better in proportion to the richness of the soil that the plants grow in. This being the case the soil, if not naturally rich, should be made so. No fertilizer is so good for this purpose as barn-yard manure, as it adds more humus to the soil than any other and is a complete fertilizer. This should be applied, when it can be obtained, in the manner already described in the preparation of the soil. Leguminous crops, such as clover and pease, ploughed under in the autumn are also very useful in adding nitrogen and humus to the soil. As a fertilizer with a fair proportion of potash is required, there is nothing better than wood ashes to suply it. Wood ashes may be applied broadcast in the spring when the land is being prepared for the plants, at the rate of 50 to 100 bushels per acre. If it is not convenient to furnish the necessary nitrogen, phosphoric acid and potash by the proper use of barn-yard manure, green crops, and wood ashes, it will be necessary to use a judicious mixture of the more expensive fertilizers to supply it, such as nitrate of soda, ground bone, and muriate of potash.

POLLINATION.

It occasionally happens that a person who has a variety of strawberry which yields much better with him than other varieties which he has growing along side, concludes to discard all his other kinds and grow that one variety. He does so and is disappointed to find that he has very few berries, and these ill-shaped and worthless. He does not know what to think about it, but writes to the Experimental Farm to learn what is the matter. The reply is sent back: 'Are you aware that the flowers of strawberries may be perfect or imperfect, or bisexual and pistillate ; in other words, do you know that some varieties of strawberries produce blossoms which have both male and female organs, while other varieties have only female organs; if you do not, the solution of your difficulty is very easy ?'

The male and female organs in plants perform the same functions as in animals, the fine dust formed on the stamens, which is shed when the flower is in bloom, is the fertilizing agent, it falls on the pistil and fertilization takes place. If the stamens are absent, or nearly all absent, as is the case in imperfect or pistillate flowers, no fruit, or very little fruit is formed. If a perfect or bisexual flowering variety and an imperfect flowering variety are growing in close proximity the flowers on both will be fertilized, as insects and winds carry the pollen or dust from the perfect to the imperfect. It very often happens that imperfect flowering varieties produce the best crops when properly pollinated, and this experience may lead fruit-growers who are ignorant of the foregoing facts, to make the mistake of planting only one variety, which may be imperfect.

A row of a perfect flowering sort should be planted to about every three or four rows of an imperfect variety to have good results. Of course, it is not necessary to plant an imperfect variety at all, as there are plenty of good sorts which have perfect flowers. It is essential to have the perfect and imperfect varieties in full bloom at the same time, as if the former bloomed before the latter there would be no object in planting it as a pollinator.

VARIETIES.

There are now so many varieties of strawberries offered for sale that it is very puzzling to the intending planter to know just what sorts to select. Some varieties

succeed better on certain kinds of soil and in certain districts than others, and the recommendations given as to the best varieties to plant should not be taken to mean that in all cases they will give better results than any others, but most of those which succeed best in one place will succeed best in others.

At the Central Experimental Farm there were 350 varieties tested during the past season. Of these, fully 75 per cent would not be worth growing anywhere where other kinds could be obtained. Probably over half of the kinds tested this season will be discarded next year.

The different varieties in the plantation are planted in rows 15 feet in length and 3½ feet apart, there being two rows of each kind. They have all been given as nearly uniform conditions as possible, and on the whole it was a fair test. Some of the tenderer varieties were more or less winter-killed last winter, but most of them came through in good condition. The season this year was a very good one for strawberries. In the following table the yields and other data is given of the twenty-five varieties which yielded best, the names being arranged in order of yield. The letter B stands for bisexual or perfect and the letter P for pistillate or imperfect flowers.

TWENTY-FIVE best Yielding varieties of Strawberries, 1900.

Name.	Bisexual. Pistillate.	Date of Full Bloom.	Date of first ripe Fruit.	Date of First Picking.	Date of last Picking.	Number of Pickings.	Weight of 25 average Berries.	Total Yield.
	Sex.						Oz.	Lbs. Oz.
Daisy	P.	June 8	June 22	June 23	July 20	12	10¾	33— 2½
Afton	P.	" 7	" 20	" 23	" 20	12	6¼	31— 6
Stevens' Early	P.	" 6	" 20	" 23	" 17	10	7¾	28— 5½
Warfield	P.	" 8	" 23	" 25	" 17	10	7½	27— 6¼
Carleton	P.	" 8	" 26	" 27	" 17	8	8¾	26— 2
Howard's 41	P.	" 9	" 25	July 2	" 20	7	8¾	25— 2½
Mattie Warfield	P.	" 8	" 25	June 25	" 17	9	5½	22— 5½
Mele	P.	" 7	" 23	" 27	" 18	8	7¼	22— 3½
Wonderful	P.	" 11	" 28	July 4	" 20	5	6¼	22— 1½
Bomba	P.	" 8	" 23	June 27	" 13	7	7¾	21— 0¾
Buster	P.	" 9	" 26	" 28	" 20	8	10¾	20— 8¾
Maggie	P.	" 6	" 20	" 23	" 17	9	7¼	19— 8¼
Stone's Early	P.	" 8	" 22	" 23	20	11	5¼	19— 4
Judsonia	B.	" 8	" 25	" 28	" 20	8	7½	19— 3¼
Thompson's Late	P.	" 6	" 28	" 30	" 20	7	4½	18—15½
Glen Mary	B.	" 8	" 23	" 27	" 20	9	11	18—12
Swindle	P.	" 8	" 23	" 27	" 20	8	8¼	17—11¼
Williams	B.	" 8	" 25	July 4	" 14	5	7½	17— 9½
Enhance	B.	" 7	" 25	" 2	" 20	7	9½	16— 4
Sam Sperry	B.	" 9	July 2	" 4	" 20	5	7½	15—14¾
John Little	P.	" 8	June 18	June 23	" 17	10	4⅝	15—11
No Name	B.	" 8	" 23	" 25	" 13	8	9½	15— 9¾
Hattie Warfield	P.	" 8	" 25	" 27	" 17	7	7	15— 9½
Dora	P.	" 8	" 25	" 25	" 17	8	6	15— 4½
Satisfaction	B.	" 8	" 27	July 2	" 17	6	9¼	15— 2

Although the twenty-five varieties in the preceding table yielded better than any other sorts this year, they are not necessarily, on that account, the best kinds to plant, as some of them do not always yield as well, while others are not of good size or quality.

The following twenty-one varieties, of which descriptions are given, are the best of all those which have been tested at the Central Experimental Farm during the past few years; the experience of other growers being also taken into consideration in the selection:—

Afton, P.—Fruit above medium size, round-conical, regular, firm, deep glossy red, acid. Quality medium. Season medium. Plant a strong grower. This proved a heavy cropper this year. The fruit is attractive looking, resembling Warfield very much.

Beder Wood, B.—Fruit medium size, round-conical, regular, rather soft, pale red, acid. Quality medium. Season early. Plant a strong grower. Although this variety does not appear among the twenty-five yielding best this year, it has yielded well here in the past and has given good satisfaction elsewhere. It is specially useful as a pollinator of other early sorts.

Bubach, P.—Fruit large to very large, wedge-conical, irregular, bright red, moderately firm, sub-acid. Quality good. Season medium. Plant healthy, but does not set many runners. It is a favourite amateur berry, and is well adapted for the hill system. It is not productive enough to be grown extensively for commercial purposes except on very rich ground.

Brandywine, B.—Fruit above medium to large, roundish or sugarloaf in shape, firm, deep red, brisk sub-acid, good flavour. Quality very good. Season late. Plant a strong grower. This is rather an uncertain berry, but when the season is favourable it does well, and on account of its lateness and fine flavour should be planted in the home garden.

Buster, P.—Fruit large, roundish, regular, bright, but inclined to be pale red, moderately firm, juicy, sub-acid. Quality above medium. Season medium to late. Plant a strong grower. This is a very productive variety of good size and attractive appearance, and it maintains its size well to the end of the picking season. It is one of the most promising varieties of those grown at Ottawa.

Carleton, P.—Fruit above medium size, roundish, regular, moderately firm, pale red, juicy, sub-acid, pleasant flavour. Quality good. Season late. Plant a strong grower. This is a productive seedling originated by Dr. W. Saunders, and on account of its late season should prove valuable.

Clyde, B.—Fruit large to very large, roundish, moderately firm, rather pale red, juicy, sub-acid, pleasant flavour. Quality good. Season medium. Plant healthy, but does not set runners freely. Has a small amount of foliage for the quantity of fruit. This is a very productive berry when given good culture on rich soil. Its popularity has increased more rapidly than any other variety during the past few years. It is rather light coloured for some markets, and not firm enough for others. Although this variety did not yield well enough this year to appear among the twenty-five most productive, in 1898 it yielded third best of 290 varieties.

Daisy, P.—Fruit above medium size, round-conical, rather soft, bright glossy red, juicy, acid. Quality medium. Plant a strong grower. Season medium. A very attractive looking berry, and the most productive this year. For a near market, where large berries of fine quality are not demanded, this should prove one of the most profitable sorts to grow.

Glen Mary, B.—Fruit very large, roundish to wedge-conical, irregular, moderately firm, bright red, juicy, sub-acid. Quality medium. Season medium. Plant a strong grower. This is one of the few large fruiting varieties which combine great productiveness with size of fruit, and is, therefore, a good kind for a commercial plantation.

Greenville, P.—Fruit large to very large, roundish or wedge-shaped, moderately firm, bright red, sub-acid, pleasant flavour. Quality good. Season medium. Plant

a strong grower. This has not proved among the most productive, but it is one of the best for home use or special market.

Haverland, B.—Fruit above medium to large, pointed-conical, irregular, moderately firm, light scarlet, sub-acid. Quality medium. Season medium. Plant a strong grower. Haverland has proved a very productive and profitable berry with some growers in the vicinity of Ottawa, but it has not yielded very well with us. It appears to succeed best on heavy soil; that at the Experimental Farm is light.

Howard's No. 41, P.—Fruit medium size, round or pointed-conical, firm, bright red, acid. Quality medium. Season late. Plant a very strong grower. This is one of the most productive late berries that has yet been tested. It yielded sixth best this year. Where late berries are required without reference to quality this should prove one of the most profitable kinds to plant.

Marshall, B.—Fruit large to very large, roundish, rather irregular, firm, dark red, sub-acid, high flavour. Quality very good. Season medium. Plant vigorous, but few runners are set. This is one of the finest strawberries in cultivation. Its great size, rich colour and excellent quality make it an almost ideal berry for the table. It is, however, not very productive and needs high cultivation to be profitable. It is well adapted for growing in the hill system.

Nick Ohmer, B.—Fruit large, roundish, firm, deep red, sub-acid. Quality good. Season medium to late. Plant vigorous. Has not so far proved productive, but is a berry of fine appearance and would sell well. It is well spoken of elsewhere.

Parker Earle, B.—Fruit large, roundish, elongated, moderately firm, rather pale red, sub-acid. Quality above medium. Season late. Plant a strong grower. In some places the Parker Earle has given great satisfaction on account of its productiveness. At the Experimental Farm it has not done as well as many others.

Ridgeway, B.—Fruit medium size, roundish, firm, bright red, sub-acid. Quality good. Season late. Plant a strong grower, but does not set runners freely. Has not yielded well at the Experimental Farm, but has done well elsewhere.

Sample,P.—Fruit large, pointed-conical, moderately firm, bright red, acid. Quality above medium. Season medium to late. Plant a strong grower. Has not been long enough tested here to thoroughly ascertain its merits. Well spoken of elsewhere.

Stevens' Early, P.—Fruit medium to above medium size, pointed-conical, sometimes round-conical, firm, bright to deep glossy red, acid. Quality medium. Season early. This variety was much the most productive early sort tested this year.

Warfield, P.—Fruit above medium to medium size, pointed-conical, moderately firm, deep glossy red, acid. Quality medium. Season fairly early. Plant is a very strong grower and one of the hardiest. This variety has proved one of the best commercial berries at the Central Experimental Farm. Its hardiness, great productiveness and attractive and regular shaped fruit are the chief points in its favour.

Williams, B.—Fruit large, wedge-conical, firm, deep glossy red, the tip often remaining white when the rest of the berry is ripe, sub-acid. Quality good. Season medium. Plant a strong grower. While this berry is not a good one from the consumer's point of view, on account of the white tip, and also, often the hard core, it has proven very profitable to many growers, as it is productive and ships well.

William Belt, B.—Fruit large to very large, rather irregular, varying from wedge-conical to pointed-conical, the largest berries being cockscomb in shape. It

is firm, bright red, brisk sub-acid. Very good quality. Season late. Plant a strong grower, but has not proved perfectly hardy here ; this defect, however, has not been heard of elsewhere. It is said to rust badly, but this has not been the experience at Ottawa. One of the best berries for home use.

Other comparatively new sorts which are being tested and which appear promising are : McKinley, Klondyke, Hood River, and Gladstone. The Senator Dunlap and Rough Rider, two varieties which have been much advertised recently, are also being tested. Mayflower was one of the most promising extra early varieties which fruited this year.

Of the twenty-one varieties described, the following are specially recommended for general and special markets and for home use. None of these varieties are extra early sorts, as it has been found that most of the very earliest kinds, such as Michel's Early, are such poor croppers that they are unprofitable. As it is important when planting varieties to plant those which bloom at the same time in close proximity, the dates of blooming of the different kinds are included in the table.

VARIETIES RECOMMENDED FOR A GENERAL MARKET.

Variety.	Sex.	Season.	Date of First Bloom.	Date of Full Bloom.	Date of 1st Picking.	Date of Last Picking.
			1900.	1900.	1900.	1900.
Warfield	Pistillate	Early	June 1	June 8.	June 25	July 17
Beder Wood	Bisexual	"	May 30	" 7	" 23	" 17.
Clyde	"	E'ly to Med.	June 4	" 9	" 27	" 20
Glen Mary	"	Medium	" 1	" 8	" 27	" 17
Haverland	"	"	" 1	" 8	" 27	" 20
Williams	"	"	" 1.	" 8	" 23	" 17
Buster	Pistillate	Late	" 4	" 9	" 28	" 20
Howard's No. 41	"	"	" 4.	" 9.	July 2	" 20

VARIETIES RECOMMENDED FOR A SPECIAL MARKET OR FOR HOME USE.

Marshall	Bisexual	Medium	June 1	June 8	June 27	July 17
Bubach	Pistillate	"	" 4	" 9	" 27	" 17
Greenville	"	"	" 1	" 8	" 25	" 17
Nick Ohmer	Bisexual	Med. to late	" 4.	" 9	" 27	" 18
William Belt	"	Late	" 4.	" 9	July 4	" 17
Brandywine	"	"	" 4	" 9	June 30	" 20

SEEDLING FRUITS.

Comparatively few seedling fruits were received for examination this year, and of these none were better or as good as the named varieties which succeed well in the districts from which the seedlings were sent. While it is very desirable that all seedlings of merit should become known, it has not been thought necessary to describe at full length any of the following kinds. As the collection of named varieties and unnamed seedlings is now very large at the Central Experimental Farm, there is a good opportunity of comparing the seedlings sent in with the best apples of the same season grown at Ottawa, and it is hoped that any who have seedlings whose merits they would like judged will send them to the horticulturist for this purpose.

No. 191—Robt. Hamilton, Grenville, Que.—Apple resembling La Victoire.

No. 192—Jules Lagace, St. Hilaire, Que.—Large streaked apple of medium quality.

No. 193—G. H. Caughell, Aylmer, Ont.—Medium sized, yellow, sweet summer apple.

No. 194—Thos. Orgill, Glen Orchard, Ont.—Small, red crab-like apple of rather poor quality.

No. 195—W. H. Lambert, Vanbrugh, Ont.—A medium sized, streaked, autumn apple of good quality.

No. 196—Alex. Skinner, Lindsay, Ont.—One of the most promising of those received. Large, red; quality above medium. Season, autumn.

No. 197—A. Clifford, Richard's Landing, Ont.—A large handsome apple, somewhat resembling Ben. Davis. Quality, medium. May be useful in the north.

No. 198—J. P. Cockburn, Gravenhurst, Ont.—An apple of medium size, splashed and washed with bright red on sunny side. Quality, above medium ; season, probably early winter.

No. 199—J. P. Cockburn, Gravenhurst, Ont.—Nora, medium size, oblong apple. Quality, above medium. Season, probably December to February.

No. 200—J. P. Cockburn, Gravenhurst, Ont.—Sally Brown, above medium size, oblate, splashed and streaked with red. Past condition for judging quality, Season, autumn.

No. 201—J. P. Cockburn, Gravenhurst, Ont.—Brydon Seedling ; medium sized, red, winter apple of medium quality.

No. 202—Wm. Spreadborough, Bracebridge, Ont.—Willen, a small, red winter apple of good quality. May prove valuable in the north.

SPRAYING.

As the advantages of spraying have been thoroughly proven and demonstrated by men who have been employed by the Government to do this work, and as the matter has been written about time and again in reports, bulletins, periodicals, newspapers, and spraying calendars, one might be led to think that all farmers and fruit growers would now spray their trees as a matter of course, just as they plough their fields. But this, unfortunately, is not the case, and there is still a large proportion of men engaged in fruit growing who do not spray. There is also another class of men who, knowing that spraying with Bordeaux mixture and Paris green will materially lessen the amount of scab and codling moth, do spray their trees, but are not satisfied with the results ; the reason of the poor success being, either that the mixture is not properly made, the trees are not sprayed thoroughly, or the spraying is not done at the proper time. Spraying is an expensive operation, and it is surprising that so many continue to waste hard-earned money by not doing the work properly. The early sprayings are the important ones, and these are too often neglected on account of press of other work, and when spraying is begun it is often too late to be of much service. A certain number of sprayings are suggested in the spraying calendars, and the times when they should be made. It should, however, be impressed on those who spray, that if heavy rain occurs before the mixture has dried on the trees, it will be washed off and the work must be done over again. The neglect of this is probably one of the chief causes of poor success in spraying. Spraying should be done thoroughly, and the underside of the leaves should receive as much of the spray as the upper sides. Every leaf or fruit missed means a foothold for disease or insect pests.

In preparing the mixtures and solutions, the formulæ given on the spraying calendars prepared by the Central Experimental Farm and similar institutions, should be followed as closely as possible. If a man knows the chemical composition of the materials he uses, and has made a special study of spraying, he may alter them slightly to meet certain circumstances, but if his knowledge of the materials used goes no further than the name, he should follow the instructions closely. He should also do his spraying at the seasons suggested. A delay of a few days may mean the loss of practically all the mixture or solution used without getting anything in return.

EXPERIMENTS WITH LIME MIXTURES FOR THE ERADICATION OF SCALE INSECTS.

During the winter of 1898-9, experiments were conducted at the Central Experimental Farm in the whitewashing of trees to retard the swelling of the buds in spring. Among the trees sprayed were some apple trees which were infested with the oyster-shell bark-louse. When the whitewash came off the trees during the summer it was found that they were practically free of that insect. The old scales had disappeared and scarcely any new ones could be found. The bark of the trees was much brighter and cleaner also than those which had not been sprayed. No notes had been taken as to how much the trees had been infested with the scales the previous autumn, but there was good evidence to show that they had been there. There had been 6 trees sprayed and they were all nearly equally clean. The formula used for the wash was lime, 60 pounds ; water, 24 gallons ; skim milk, 6 gallons. A thick mixture and one rather hard to get through the spray pump, but it made a good wash for the purpose it was intended, namely, to whiten the trees.

Although such good results had been obtained, it was not known at that time whether the strong mixture or the number of sprayings had most to do with the removal of the scales. The trees had been sprayed six times. If it were necessary to spray as often as that to rid the trees of the oyster-shell bark-louse it would not prove an economical practice. Experiments were therefore planned to discover, if possible, how many applications were necessary.

Following are the results obtained. The formula used was simply 2 pounds lime to 1 gallon of water. Notes were taken before spraying the trees as to how badly each tree was infested with the scales. The trees were sprayed on November 17, 20, 27, and December 7, 1899. The mixture did not stick nearly as well as when skim milk had been used the previous winter and was peeling off badly ten days after it was applied. The words 'slightly', 'considerably' and 'badly', indicate the degree of infestation, and while not exact, give an idea of the amount of scales on the trees. When only a few scales are said to be on the trees it means that the tree was practically rid of them and only an occasional scale could be found.

EXERIMENT MADE IN NOVEMBER AND DECEMBER, 1899.

Formula Used. Number of Trees Sprayed. Number of Times Sprayed.	How Infested before Spraying, November, 1899.	How Infested after Spraying, November, 1900.
2 lbs lime ; 1 gallon water.		
5 trees Sprayed twice	All considerably	Three with scarcely any scales left ; two slightly.
6 trees Sprayed three times	Four badly ; two considerably	Three with scarcely any scales left ; one slightly ; two considerably.
2 trees. Sprayed four times	One considerably ; one badly	Only a few scales left on both.

The results obtained in this experiment were very convincing. It was clearly proven that it was not necessary to add anything to the mixture for the purpose of making it stick better to the tree, as the loosening of the scales by the lime must have occurred within the first two weeks after the mixture was applied, as the wash was cracking off badly within ten days after the trees received the second application. It was also clearly shown by this experiment that two sprayings were quite sufficient to give satisfactory results.

EXPERIMENT MADE IN MARCH, 1900.

The experiment tried in the autumn of 1899 had afforded much proof that it was the caustic property of the lime which had been the means of loosening the scales and that there need not be many applications to get the results desired. From this evidence experiments were planned for the purpose of determining, if possible, the minimum strength of lime necessary to obtain satisfactory results and also to get further proof regarding the number of sprayings which it was necessary to make. Up to that period the time of the year at which it was best to do this work had not been given serious attention, as it was thought that any time when the trees were dormant would do.

The following table gives the various formulæ used, the dates of application and the results obtained. The sprayings were made during the month of March.

EXPERIMENT MADE IN MARCH, 1900.

Formula Used. Number of Times Sprayed.	How Infested before Spraying, March, 1900.	How Infested after Spraying, December, 1900.
1 lb. lime; 1 gallon water.		
Sprayed twice....	Both considerably	One slightly; only a few scales left on the other.
" three times.....	" "	Both slightly.
" Four times	" "	One still considerably; only a few scales left on other.
1 lb lime; 1 gallon water; 1 quart. skim milk.		
Sprayed twice...	Both considerably	Both slightly.
" three times....	" "	One slightly; only a few scales on other.
" four times.....	One badly; one considerably....	One badly; one considerably.
2 lbs. lime; 1 gallon water.		
Sprayed twice.... ...	Both badly	Only a few scales left on each.
" three times. ..	"	Both considerably.
" four times.....	"	One Badly; one considerably.
2 lbs. lime; 1 gallon water; 1 quart. skim milk.		
Sprayed twice..........	Considerably (one tree)..........	Considerably.
" three times ...	Both considerably	One slightly; a few scales left on other.
" four times....	" "	One slightly; one considerably
3 lbs. lime; 1 gallon water.		
Sprayed twice.	Both badly	One slightly; one badly.
" three times....	"	One badly; a few scales left on other.
" four times.....	"	One slightly; one considerably.
2 lbs. lime; 1 gallon water; 1 quart. skim milk; 5 oz. salt.		
Sprayed twice....	Both badly..................	One slightly; one considerably.
" three times.. .	"	One slightly; a few scales left on other.
" four times.....	"	Both badly.

The results obtained from the experiments tried in March, 1900, are rather conflicting. One accurate conclusion, however, may be drawn, namely, that autumn, and not late winter or spring, is the best time to spray the trees for this purpose.

As large a proportion of scales appear to have been removed by the thinnest washes in this experiment as by the thickest. It would seem, from some of the results obtained, that the thicker and stickier mixtures had the effect of glueing the scales to the trees, thus counter-balancing in a greater or less degree the action of the lime in loosening them. In all cases, many scales were removed from the trees, but a few were so badly affected that they were still badly affected after being sprayed.

EXPERIMENT TO DETERMINE IF THERE WOULD BE ANY INJURY TO THE TREE FROM LIME IF APPLIED WHEN BUDS WERE BURSTING.

As it was not known whether the lime would have any injurious effects on the young growth of the trees (no injury having been observed when the trees were sprayed when dormant), the following experiment was made:—

An apple tree which was considerably infested with bark-louse, was chosen for this purpose. The formula used for the first spraying was 2 pounds lime, 1 gallon water, 1 quart skim-milk, 5 ounces salt; and for the second spraying the same, without the salt. At the time of the second spraying the leaf buds were bursting. The lime covered the young leaves, which were just showing, and no injury resulted. The tree bloomed freely, and there evidently had been no injury to the flower buds. The young lice began running at the usual time.

EXPERIMENT TO DETERMINE THE EFECT OF A LIME MIXTURE ON THE SAN JOSE AND NEW YORK SCALES.

An experiment was tried at Niagara in December, 1899, to determine if a lime mixture sprayed on peach trees would have any effect on the San José scale. Ten trees were used, all of which were more or less infested with it.

Three trees received one application ; two trees, two applications ; two trees, three applications; and three trees, four applications. The various sprayings were made between December 21, 1899, and January 4, 1900. The formula used was 60 pounds lime, 10 pounds salt, 6 gallons skim-milk, and from 28 to 30 gallons water. A very thick and strong mixture.

The trees were examined on June 21, 1900, but no injury to the scales could be detected.

Four plum trees which were infested with the New York scale were sprayed on December 21, 1899, with the same mixture. Two trees received one application and two, two applications. These trees were also examined on June 21, 1900, but the lime had evidently not had any effect on this insect either.

No injury was caused to either the plum or peach trees by the use of the lime mixture.

EXPERIMENTS IN PROGRESS.

Experiments are in progress this winter to determine, if possible, the most economical and satisfactory formula to use in spraying to eradicate the oyster-shell bark-louse.

HOW TO MAKE AND APPLY THE LIME MIXTURE.

Only good stone lime should be used. The lime is slaked in warm water, stirring it so that it will slake well, and the remainder of the water is then added, and the whole thoroughly stirred. It is then strained through a sieve having a mesh about one-twelfth inch in diameter, and is ready for use. A mild day should be chosen, so that the mixture may have a chance to flow about the scales without freezing. It is more satisfactory to apply the mixture while it is yet warm. A less strength than 2 pounds of lime to 1 gallon of water can be sprayed through a large barrel pump without danger of clogging, but if 2 pounds or more to 1 gallon is used it is necessary to use a smaller pump so that it may be cleaned easier should it clog.

CONCLUSIONS REACHED UP TO NOVEMBER 1900.

1. Lime slaked in water and sprayed on apple trees infested with the oyster-shell bark-louse has the effect of loosening the scales.

2. The scales, when loosened, are removed from the trees by rain, ice, wind, and probably by other means.

3. As the scales contain the eggs from which the young insects hatch about June 1, it is necessary, in order to get the best results, that the trees be sprayed as soon as possible after the leaves fall in autumn, so that the loosened scales may be exposed to the weather for a long time before the eggs hatch.

4. The lime appears to have no injurious effect on the eggs within the scales.

5. Lime used in various proportions in the several experiments had no apparent injurious effects on apple or peach trees. Even when the leaf buds were opening no injury occurred.

6. As the action of the lime seems to occur soon after the trees are sprayed, it is not necessary to use any substance other than water to help bind it to the tree. On the contrary, it would appear that such substances counterbalance the effects of the lime, for a time, by glueing the scales to the trees.

7. It is important to use good stone lime, which has not been air-slaked.

8. As no experiments were conducted in the autumn of 1899, to determine what proportion of lime was necessary to get satisfactory results, and as it has been found that spraying in late winter or early spring is not a very good time, it is not possible yet to say what is the most economical formula to use. As nearly all the scales were removed from some of the trees, which were sprayed with 1 pound lime to 1 gallon water in March, 1900, it is quite likely that satisfactory results will be obtained by using that mixture in the autumn.

9. It is necessary to make at least two applications, as those scales with which the mixture does not come in contact will not be effected by it, and it is not possible to do the work thoroughly with one spraying.

10. The lime mixture applied in winter evidently has no effect on the San José or New York scales.

11. The bark of trees sprayed with the lime mixture is much brighter afterwards than on trees not sprayed, and it is possible that many fungus germs are destroyed.

COVER CROPS.

The importance of cultivating orchards has for ten years or more been impressed upon fruit growers in America, on every possible occasion. It has been found, however, after several years' experience that the constant stirring of the soil lessens the amount of humus in it to such an extent that in districts where droughts occur frequently it becomes a burning question how to restore humus cheaply to the soil ; for as soil with plenty of humus holds moisture better than soil with little of it, the amount of moisture conserved by cultivation is becoming less every year where humus is not restored. Of late years there have been some severe winters, when fruit trees were root-killed by the thousands, and thus another question arose as to how best to protect the roots of the trees sufficiently to save them. Thus developed the value of the so-called 'cover crop,' which, although it had been grown by many fruit growers for years back, did not become a prominent feature in Canadian horticulture until the last six or seven years.

At the Central Experimental Farm the importance of cover crops has been fully recognized, and experiments have been conducted with them since 1895, and in the horticulturist's reports for 1896, 1897, 1898 and 1899, the experience which had been obtained concerning the different plants used for this purpose, and other matters concerning them, was published.

The best time to sow seed for a cover crop is sometime in the month of July, preferably about the middle, as the growth of the fruit trees is well advanced by that time, and the fruit itself well developed. The seed should be sown, if possible, when the ground is moist, as at that time of year it will germinate quickly if there is moisture. At the Central Experimental Farm it has been found that Common Red clover or Mammoth Red clover, sown broadcast at the rate of 12 pounds per acre, gives the best results, although on light soil, Lucerne, sown at the rate of 15 pounds per acre, will grow taller by autumn and hold the snow better. After the seed is sown the land should be rolled, as this will bring the moisture to the surface and about the seed and hasten germination. It is important to get growth started in good time, as there is often protracted drought in July and August which prevents germination and spoils the prospect for a good cover crop. Buckwheat and rye also make good cover crops, but the advantage of using clovers is that they are what are known as leguminous plants, and these assimilate nitrogen from the air through the nodules on their roots; thus, by using this class of plants, nitrogen, the most expensive plant food, may be had for the price of the seed. The Hairy Vetch (*Vicia villosa*) has given good satisfaction where it has been tested. In dry districts where it is difficult to get a catch of clover, this is likely to prove very valuable. It grows until late in the autumn, as it takes a severe frost to kill it. It also belongs to the leguminous class of plants. It has not proved hardy at Ottawa, though as yet only tested in small plots.

In the spring the clover may be let grow until there is a good crop to plough under, but in those districts where drought is likely to occur in the summer, it is much better to plough the land as soon as it can be worked, without waiting for any new growth. The following figures, taken from Bulletin 164, of the Michigan Experiment Station, show how much moisture may be saved by ploughing early :—

'Two tests were made in Field No. 6. The ploughing was done May 2. Samples were taken for determination of moisture on May 10 and 17, with the following results :—

May 10.	1st Foot.	2nd Foot.	3rd Foot.	Average 3 ft.
	Per cent.	Per cent.	Per cent.	Per cent.
Spring ploughed	10·50	10·07	8·04	9·54
Not ploughed	10·10	8·12	7·26	8·49
	·40	1·95	·78	1·05
May 17.				
Spring ploughed	9·33	6·75	6·97	7·68
Not ploughed.	8·78	5·92	6·82	7·17
	·55	·83	·15	·51

'This gives a difference in the first instance of 2·8 pounds per square foot to a depth of 3 feet, and of 1·4 pounds in the second instance, in favour of the land ploughed early in the spring.

'Experiments tried by Professor King, and reported in the Wisconsin Report for 1891, pages 101 and 102, show larger differences. The ploughing was done on April 29 and samples taken on May 6, showing a difference for the upper 3 feet of 7·02 pounds of water per square foot. On another plot the observed difference of the samples taken on May 14 to the same depth was 4·65 pounds.

These determinations all show that to have as large a supply of moisture as possible for the crop it is necessary to plough or work the soil in some way to form

a mulch to prevent evaporation as early in the spring as the condition of the land will allow.

The advantages, then, of a cover crop are, first, that the mass of foliage and stems which it produces helps to prevent the frost from going deep into the soil, and also prevents, to a large extent, that thawing and freezing of the soil in the spring which is so harmful to the roots of trees.

2nd. The cover crop helps to prevent the snow from blowing away, and thus a thicker covering is formed for the protection of the roots of the trees.

3rd. Humus is added to the soil by ploughing it under, thus increasing its water-holding capacity and fertility.

4th. Nitrogen is added to the soil without other expense than the price of the seed.

5th. A cover crop growing in the orchard in autumn will utilize plant food, which has been made available during the summer, and thus prevent it from leaching away. It thus becomes a 'catch crop' as well.

LIST OF BEST VEGETABLES FOR FARMERS.

As all the experiments which are conducted with vegetables cannot be published every year on account of want of space, a list of the varieties of all the principal kinds which have proved the most satisfactory after several years' tests was published in the report for 1899 under the heading 'List of best Vegetables for Farmers.' This gave in a concise form much valuable information as to the best varieties to plant and must have proved very helpful to those who studied it. As the annual reports are very liable to be mislaid during the year, and as one is apt to forget the name of a variety, it has been thought advisable to again publish this list with what changes another year's experience warrants making.

Asparagus.—Connover's Colossal is the best all-round variety.

Beans.—Golden Wax or Wardwell's Kidney Wax, for early crop; Early Refugee, for medium; and Refugee or 1,000 to 1, for late crop, are the most satisfactory dwarf varieties. Southern Crease-back and Asparagus (early) and Golden Andalusia (late) are the best pole varieties.

Beets.—Egyptian Turnip, Eclipse and Bastian's Blood Turnip are three of the best varieties.

Borecole or Kale.—Dwarf Green Curled Scotch is the best.

Broccoli.—White Cape.

Brussels Sprouts.—Improved Dwarf is the most satisfactory.

Cabbage.—Early Jersey Wakefield (early), Succession (medium); Late Flat Dutch, Drumhead Savoy (late), Red Dutch (red), is a select list of the best varieties of cabbage.

Cauliflowers.—Extra Early Dwarf Erfurt and Early Snowball (early); Kronk's Perfection (medium) and Large Late Algiers are among the best.

Carrots.—Chantenay and Guerande or Oxheart are two of the best carrots, but if a good extra early sort is required, the Early Scarlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching, Paris Golden Yellow, Improved White Plume, White Walnut (early); London Red, Perfection Heartwell, White Triumph (late) are among the best.

Corn.—Early White Cory, Crosby's Early, Henderson's Metropolitan (early); Perry's Hybrid, Stabler's Early, Early Evergreen (medium); Stowell's Evergreen, Country Gentleman (late). In planting, the Country Gentleman should not be omitted, as it lengthens the season very considerably, and is of fine quality.

Cucumbers.—Peerless White Spine or White Spine, Cool and Crisp, and Giant Pera are three of the most satisfactory slicing varieties. Boston Pickling is a good pickling sort.

Egg Plants.—New York Improved and Long Purple succeed best.

Lettuce.—Black Seeded Simpson, New York (curled), Tennis Ball, Salamander and Golden Queen (cabbage); Trianon and Paris Cos lettuce make a good list.

Melons, Musk.—Long Island Beauty, Hackensack and Montreal Market, of the Nutmeg type, and Surprise, Bayview, Paul Rose and Emerald Gem, of the other types, are all good.

Melons, Water.—Cole's Early, New Imperial, Ice Cream, and Phinney's Early are early water melons of excellent quality.

Onions.—Yellow Globe Danvers and Large Red Wethersfield are two of the best onions in cultivation.

Parsnips.—Hollow Crown and Dobbie's Selected are both good sorts.

Parsley.—Double Curled is as good as any.

Peppers.—Cayenne, Cardinal, Squash and Golden Dawn are four of the best.

Pease.—Gregory's Surprise, Gradus, Nott's Excelsior and Premium Gem (early); McLean's Advancer, Improved Stratagem and Heroine (medium). None of these are tall growing varieties. Juno (dwarf), Telephone, Veitch's Perfection (tall), (late). Nott's New Perfection is a promising second early sort, and Dwarf Telephone and Startler two promising late varieties.

Potatoes.—Extra Early: Early Ohio and Early Andes (pink), Bovee and Burpee's Extra Early (pink and white). Early: Everett and Rochester Rose (pink), Early Puritan (white). Medium: Carman No. 1 (white), Empire State (white). Late: Late Puritan (white), American Wonder (white), Rural Blush (pink).

Radishes.—Early: Rosy Gem, French Breakfast, Red Rocket (red) and Icicle (white). Late: White Strasburg, Long White Vienna. Winter: Long Black Spanish, Chinese Rose-coloured.

Rhubarb.—Linnæus and Victoria are the most satisfactory.

Salsify.—Long White is the best.

Spinach.—Victoria and Thick-leaved are the best.

Squash.—Early: White Bush Scalloped and Sumer Crook Neck. Late: Hubbard.

Tomatoes.—Early: Conqueror, Dwarf Champion, Canada Victor and Early Ruby. Main Crop: Brinton's Best, Livingston's Favourite, Matchless, and Baltimore Prize Taker.

There are many varieties of this vegetable which are almost equal in excellence and productiveness. Spark's Earliana is a promising early sort tested this year.

Turnips.—Early: Extra Early Milan and Red Top Strap Leaf. Swedes: Champion Purple Top, Skirving's Improved.

EXPERIMENTS WITH POTATOES.

This was a very good season for potatoes, and the yields were high in consequence. There was just enough rainfall to keep the ground moist all summer without it becoming too wet, and the vines made rapid and vigorous growth. There was no blight, and the potatoes appeared to ripen quite naturally.

There were 117 varieties tested at the Central Farm this year, of which the Sabean's Elephant, a comparatively new sort, gave the best crop, the yield being at the rate of 589 bushels 36 pounds per acre. The poorest yield was 209 bushels per acre, the difference in yield between the best and poorest being 380 bushels 36 pounds per acre. The average yield per acre from all the varieties tested was 417 bushels 37 pounds, being about two and three-fourths times as much as the average of Ontario this year.

If, however, these varieties had been grown by the acre instead of in small plots the yields would not have been so large, but as the poorest yielder gave about one and three-fourths times as much per acre as the average for Ontario, something must be wrong with the system of cultivating potatoes, generally adopted, or with the varieties planted.

The soil in which the potatoes were grown this year was a sandy loam, where a strawberry plantation had been the previous season. In the autumn of 1899, after the strawberry plants had been ploughed under, fall rye was sown on September 15, at the rate of two bushels per acre. On May 18, 1900, the rye was ploughed under. The land was then disc harrowed, and harrowed twice with the smoothing harrow. Drills were made about four or five inches deep and 2½ feet apart, and the sets, which were of about the same size, and with at least three eyes and a good amount of flesh, were dropped 1 foot apart, each variety occupying one row 66 feet long. The potatoes were covered with the hand hoe to get as uniform conditions as possible. The soil was harrowed once before the potatoes were up to kill any weeds which had germinated and to level the ground. The surface soil between the rows was kept loose by the cultivator until the vines met, but the latter were not hilled up, level culture being adopted. The vines were sprayed with Paris green and Bordeaux mixture to destroy the potato beetle and prevent blight. The potatoes were planted on May 25 and 26, and dug on October 9, 10 and 11.

POTATOES—TEST OF VARIETIES.

Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Sabean's Elephant	Good	589	36	528	..	61	36	White.
Vanier	Poor to med.	576	24	523	36	52	48	Red.
Enormous	Good	561	..	499	24	61	36	White.
Canadian Beauty	"	547	48	490	36	57	12	Pink and white.
Irish Cobbler	"	532	24	484	..	48	24	White.
Early Sunrise	"	532	24	473	..	59	24	Pink.
Burnaby Mammoth	"	530	12	453	12	77	..	Pink and white.
Rose No. 9	Medium	528	..	484	..	44	..	Pink.
Northern Spy	Poor	525	48	492	48	33	..	Bright pink.
Flemish Beauty Seedling	"	525	48	473	..	52	48	"
Burnaby Seedling	Good	525	48	464	12	61	36	Pink and white.
Empire State	"	519	12	466	24	52	48	White.
Money Maker	"	517	..	466	24	50	36	"
General Gordon	"	517	..	459	48	57	12	Pink.
Polaris	"	502	42	448	48	53	54	White.
Late Puritan	"	492	48	420	12	72	36	"
Seattle	Medium	490	36	444	24	46	12	"
American Wonder	Good	488	24	457	36	30	48	"
Rural No. 2	"	488	24	453	12	35	12	"
Swiss Snowflake	"	486	12	431	12	55	..	"
Peachblow		481	48	426	48	55	..	"
State of Maine	Good	481	48	424	36	57	12	"
Vick's Extra Early	"	481	48	404	48	77	..	Pink and white.
Rose of the North		479	36	396	..	83	36	Pink.
Rawdon Rose	Good	477	24	404	48	72	36	Pink and white.
New Queen	"	475	12	426	48	48	24	" "
Sharpe's Seedling	"	475	12	398	12	77	..	" "
Rochester Rose	"	470	48	413	36	57	12	Pink.
Early St. George	"	468	36	409	12	59	24	Pink and white.
American Giant	Medium	464	12	422	24	41	48	White.
Seedling No. 230	"	464	12	387	12	77	..	"
Early Market		462	..	440	..	22	..	Pink.
Early Norther	Medium	462	..	409	12	52	48	"
Rural Blush	Good	459	48	435	36	24	12	"
N. Bergeron		457	36	444	24	13	12	White, pink eye.
Dreer's Standard	Good	457	36	435	36	22	..	White.
Maule's Thoroughbred		457	36	426	48	30	48	Pink.
Brown's Rot Proof	Medium	455	24	440	..	15	24	"
Reeves Rose		455	24	387	12	68	12	"
I. X. L.	Good	451	..	396	..	55	..	Pink and white.
Jubilee	"	451	..	418	..	33	..	" "
White Elephant		446	36	415	48	30	48	" "
Columbus		446	36	411	24	35	12	" "
Penn Manor		446	36	378	24	68	12	" "
Napoleon	Good	446	36	369	36	77	..	Pink.
Vigorosa		444	24	374	..	70	24	Pink and white.
From A. S. Brosseau		442	12	426	48	15	24	Red and white.
Holborn Abundance	Medium	442	12	413	36	28	36	White.
Clay Rose	"	440	..	400	24	39	36	Pink.
Lee's Favourite	Good	437	48	363	..	74	48	"
Troy Seedling	Medium	437	48	360	48	77	..	White.
Uncle Sam		435	36	418	..	17	36	"
Burbank's Seedling	Good	435	36	409	12	26	24	"
Country Gentleman		435	36	316	48	118	48	Pink and white.
Pearce		433	24	374	..	59	24	" "
Early Pride		426	48	385	..	41	48	Pink.
Carman No. 3	Good	424	36	407	..	17	36	White.
Early Six Weeks	"	424	36	391	36	33	..	Pink.
Early Harvest	"	422	24	365	12	57	12	"
Cambridge Russet	"	420	12	404	48	15	24	White.
Wonder of the World	"	420	12	387	12	33	..	Pink and white.
Green Mountain	"	420	12	385	..	35	12	White.
Thorburn	"	420	12	358	36	61	36	Pink and white.
Mill's Prize		420	12	343	12	77	..	White.

POTATOES—TEST OF VARIETIES—*Continued.*

Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Burpee's Extra Early	Good	418	..	352	..	66	..	Pink and white.
Early Rose	"	415	48	367	24	48	24	Pink.
White Giant		407	..	382	48	24	12	White.
Sir Walter Raleigh		404	48	365	12	39	36	"
Champion		402	36	360	48	41	48	"
Everett	Good	402	36	345	24	57	12	Pink.
Great Divide	"	400	24	387	12	13	12	White.
Doherty's Seedling		400	24	356	24	44	..	"
Delaware	Good	400	24	321	12	79	12	"
Dakota Red	Medium	400	24	338	48	61	36	Red.
Early Puritan	Good	400	24	332	12	68	12	White.
Daisy	"	391	36	343	12	48	24	Pink and white.
Lizzie's Pride	"	389	24	325	36	63	48	Pink, red eye.
Early White Prize	"	385	..	369	36	15	24	White.
Bovee	"	385	..	325	36	59	24	Pink and white.
20th Century		382	48	330	..	52	48	White.
Carman No. 1	Good	380	36	352	..	28	36	"
McIntyre		380	36	352	..	28	36	" and purple.
Pearce's Extra Early	Good	378	24	363	36	14	48	Pink.
Early Andes	"	376	12	349	48	26	24	"
Seneca Queen	Very good	376	12	343	12	33	..	Pink&white with bright pink eye.
Harvest King		374	..	343	12	30	48	White.
Gem of Aroostook	Good	374	..	338	48	35	12	Pink and white.
Quaker City		374	..	334	24	39	36	White.
New Variety No. 1	Poor	374	..	299	12	74	48	"
White Beauty	Good	374	..	297	..	77	..	"
Irish Daisy	"	374	..	294	48	79	12	"
Prolific Rose		371	48	341	..	30	48	Pink.
Chicago Market	Good	369	36	341	..	28	36	"
Dark Red Seedling		367	24	341	..	26	24	Deep pink.
Pearce's Prize Winner	Good	367	24	294	48	72	36	Pink.
Rose of Erin		365	12	330	..	35	12	Pale pink, bright pink eye.
Early Ohio	Good	363	..	321	12	41	48	Pink.
Prize Taker	"	356	24	261	48	94	36	"
Livingston		354	12	314	36	39	36	White, pink eye.
Beauty of Hebron	Medium	347	36	277	12	70	24	Pink and white.
Light Red Seedling		341	..	310	12	30	48	Pink.
Livingston's Banner	Good	338	48	308	..	30	48	White.
Maggie Murphy	Medium	334	24	325	36	8	48	Bright pink.
Early Dawn		322	..	299	12	22	48	Pink, brighter at seed end.
Clarke's No. 1	Good	321	12	277	12	44	..	Pink.
Seedling No. 7	Medium	319	..	277	12	41	48	Bright pink.
Earliest of All	Good	319	..	250	48	68	12	Pink and white.
Early Michigan		310	12	259	36	50	36	
Hale's Champion	Poor	290	24	209	..	81	24	White.
Houlton Rose		272	48	206	48	66	..	Pink.
Brownell's Winner	Good	266	12	217	48	48	24	Red.
Pink Eye		255	12	220	..	35	12	
Reading Giant	Poor	244	12	220	..	24	12	Pink.
Ohio Junior		237	36	213	24	24	12	"
Seedling No. 214	Good	239	48	222	12	17	36	White.
Bill Nye		217	48	167	12	50	36	"
Pride of the Market	Good	209	..	154	..	55	..	"

TWELVE BEST YIELDING VARIETIES OF POTATOES—AVERAGE OF SIX YEARS' TESTS.

Name of Variety.	Average yield per acre.		Name of Variety.	Average yield per acre.	
	Bush.	lbs.		Bush.	lbs.
1 Holborn Abundance	419	28	7 Burnaby Seedling	365	30
2 American Wonder	411	56	8 Vanier	362	49
3 Seedling No. 230	392	41	9 State of Maine	362	32
4 Late Puritan	389	43	10 Seattle	362	8
5 Empire State	378	17	11 Polaris	360	49
6 Everett	371	3	12 Early Norther	358	56

POTATOES—PLANTING AT DIFFERENT DISTANCES APART.

During the past five years an experiment has been tried in planting the sets at different distances apart in the rows; the rows in each case being 2½ feet apart. The best results have been obtained so far by planting the sets 12 inches apart, although it will require a few years yet before accurate conclusions can be drawn. There was very little difference in the proportion of marketable and unmarketable tubers in this experiment. In former years only one variety was used in this test, but this year two were planted; the Early Andes, an early variety, and the Uncle Sam, a comparatively late one. The average results from these two varieties are given as the yields per acre for 1900.

Distance apart of Sets.	Seed required per acre.		Yield per acre, 1896.		Yield per acre, 1897.		Yield per acre, 1898.		Yield per acre, 1899.		Yield per acre, 1900.		Average yield per acre, 5 years.		Average yield per acre after deducting seed.	
	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
10 inches apart..	34	50	355	18	331		268	24	392	2	327	48	334	54	300	4
12 " ..	29	2	336	36	278	47	347	36	406	34	316	48	337	16	308	14
14 " ..	24	53	323	24	268	50	290	24	454	58	325	36	332	38	307	45
16 " ..	21	46	335	30	226	1	233	12	392	3	279	24	293	14	271	28
18 " ..	19	21	289	18	226	31	253		234	34	270	36	254	48	235	27

POTATOES—PLANTING AT DIFFERENT DEPTHS.

An experiment has been conducted during the past three years in planting potatoes at different depths in rows 2½ feet apart and 12 inches apart in the rows. The sets had at least three eyes each, and were about uniform in size. The soil was sandy loam, both years. Level cultivation was adopted, and thus very little soil was thrown on the potatoes after they were covered at the time of planting. The following table shows that the best yields were obtained from planting the sets only 1 inch deep. As the relative yields from the different depths of planting have not been the same in both years, it will be necessary to continue this test for some time before accurate conclusions can be drawn. Notes were taken on the depths at which tubers were formed in 1899 and 1900, and it was found that most of them were within 4 inches of the surface of the soil, even where the set had been planted 6, 7 and 8 inches deep. Where the sets were planted less than 4 inches deep nearly all the tubers were formed between that and the surface of the soil. Two varieties, the Sir Walter Raleigh and Empire State, were used in the test this year, and the average results from them are given as the yields for 1900. There are several reasons why the potatoes planted from one to three inches deep should give the best results. Potatoes will develop more

rapidly in warm soil than in that which is cooler. The soil within the first three or four inches of the surface is warmer than that three or four inches lower down, hence the conditions are more favourable for the potato. The tubers when the potato is in the wild state develop near the surface or on the surface of the ground. It seems natural, therefore, that the cultivated potato should be planted shallow.

On the other hand, much of the success of shallow planting will depend on the moisture of the soil. If the season is very dry the first two inches of soil may be so dry that the potato will not take root readily, and the season of growth will thus be shortened, but this has not happened here during the past three years. Once the roots begin to grow they speedily reach a depth where plenty of moisture is found.

From the results obtained it seems reasonable to conclude that where the soil is not dry the best results can be obtained from shallow planting. In any case, early planted potatoes will probably succeed best when planted shallow, as the ground will be warmer. In places where the spring is late or where the ground is cold, best results will probably be had by shallow planting.

Although the best results have been obtained in sandy loam soil by planting the sets one inch deep, this method is not recommended for field culture. Unless the surface of the soil is kept loose and free from weeds the potato crop will not be large. In order to kill a large proportion of the weeds which grow, the ground should be harrowed once or twice before the potatoes come up or just as they are coming up. If the sets were planted only one inch deep and the soil harrowed, many of them would be dragged out, hence about four inches deep would be the best.

Depth of Planting.	Yield per acre, 1898.		Yield per acre, 1899.		Yield per acre, 1900.		Average Yield per acre, 1898–1900.	
	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.
1 inch....	347	36	532	24	468	36	449	32
2 inches..	*244	12	469	28	462		358	33
3 "	281	36	493	41	422	24	399	13
4 "	277	12	520	18	404	48	400	46
5 "	290	24	474	19	334	24	366	12
6 "	264		421	5	367	24	350	49
7 "	290	24	392	3	336	36	339	40
8 "	266	12	353	19	345	24	321	38

POTATOES PLANTED AT DIFFERENT DATES.

In 1898 an experiment was begun in planting potatoes at different dates, beginning when the main crop was put in and continuing at intervals of two weeks until August 23, 1898, July 23, 1899, and July 21, 1900. An early and a late variety were used in each case, the varieties being Early Norther and Irish Daisy, in 1898, Early Norther and Rural Blush, in 1899, and Early Norther and Sir Walter Raleigh, in 1900.

In 1898 and 1899 the decrease after the third planting was so great that it appeared as if a fair crop of marketable potatoes could not be produced when the seed was planted much after June 24, but the results obtained in 1900 by planting on July 7, go to show that it is possible to produce a good crop of potatoes after a crop of early vegetables, such as pease, has been removed. The yield of marketable potatoes planted from seed of Early Norther, planted on July 7, was at the rate of 224 bushels. 24 pounds to the acre.

This experiment will be continued for several years yet.

*Note.—This great decrease in yield was probably due to a variation in the soil which it is sometimes difficult to avoid.

Date of Planting.	Total Yield per Acre, 1898.		Total Yield per Acre, 1899.		Total Yield per Acre, 1900.		Yield per Acre Marketable, 1900.		Yield per Acre Unmarketable, 1900.		Average Total Yield per Acre, 1898-1900.		Average Yield per Acre Marketable, 1898-1900.		Average Yield per Acre Unmarketable, 1898-1900.	
Early Variety.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1st planting, May 26, 1898; May 26, 1899; May 26, 1900	277	12	505	47	409	12	374	..	35	12	397	24	344	58	52	26
2nd planting, June 10, 1898; June 9, 1899; June 9, 1900	160	36	459	48	453	12	360	48	92	24	357	52	289	22	68	30
3rd planting, June 24, 1898; June 23, 1899; June 23, 1900	125	24	237	10	365	12	303	36	61	36	242	35	193	54	48	41
4th planting, July 8, 1898; July 7, 1899; July 7, 1900	30	48	9	41	268	24	224	24	44	..	102	58	74	48	28	10
5th planting, July 23, 1898; July 21, 1899; July 21, 1900	1	6	.....	.....	26	24	.....	.....	26	24	9	10	.....	.....	.....	.....
6th planting, August 9, 1898	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7th " " 23, 1898	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Late Variety.																
Planted on same dates as the early variety—																
1st planting	259	36	338	48	277	12	259	36	17	36	291	52	239	22	52	30
2nd "	173	48	164	34	338	48	277	12	61	36	225	43	162	22	63	21
3rd "	68	12	157	18	198	..	167	12	30	48	141	10	115	32	25	38
4th "	8	48	19	22	202	24	145	12	57	12	76	51	48	24	28	27
5th "	1	6	.....	.....	26	24	.....	.....	26	24	9	10	.....	.....	9	10
6th "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7th "	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

POTATOES—RECEIVED FOR TEST IN 1900.

Every year samples of potatoes are received for test which are either seedlings, not yet named, new named varieties, or varieties for identification. As the quantity received of each of these is usually smaller than that used in the uniform test plots, the comparison of yields between these and the named varieties would not be very conclusive. For this reason, the results from the samples this year are put in the following table :—

Name of Variety and Address of Sender.	Number of Sets Planted.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.	
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Red Rock from Jas. Carruthers, Magundy, N.B.	16	642	24	580	48	61	36
From Geo. Pyke, Wolf Island, Ont.	66	563	12	532	24	30	48
Early Elkinah, S. Wile, Branch La Have, N.S	16	545	36	528	..	17	36
Churchill Seedling	66	525	48	492	48	33	.
Early Summer, R. A. Snason, Uxbridge, Ont.	33	514	48	440	..	74	48
Montana Bluff, Jas. Lamb, Walkerton, Ont.	33	510	24	466	24	44	..
Dobson's Early, " "	33	497	12	453	12	14	..
Mammoth Pearl, " "	33	440	..	422	24	17	36
Wall's Orange, " "	33	422	24	396	..	26	24
Silver Dollar	16	360	48	352	..	8	48
California Cup, Jas. Lamb, Walkerton, Ont.	16	264		228	48	35	12
Dutch, Blue, A. Ferguson, Port Morien, N.S.	33	211	12	176	..	35	12

EXPERIMENTS WITH TOMATOES.

There were 167 varieties of tomatoes tested this year. A large number of these are probably synonyms, but seed under that number of names was offered for sale by Canadian and American seedsmen this year. Many of the varieties have now been tested five years, and it is proposed to discontinue growing all those which have not proved to be among the best.

The yields of the twenty-five best yielding varieties, only, are published, as space will not permit of a full table being given. In addition to this list, however, will be found the names of the six earliest varieties for this year, also the six wrinkled and twelve smooth varieties which have averaged the best yields in five years.

The seed of the tomatoes grown this year was sown in hot-beds on April 6; the young plants were pricked out into strawberry boxes on April 30, and planted in the open ground on June 7. They were placed four feet apart each way, and five plants of each variety were used. The soil was a light, sandy loam on which tobacco, which had been well manured, was grown the previous year. The soil was kept cultivated until the growth of the plants prevented it. The vines were not trained in any way, but were allowed to lie on the ground. Owing to the moist season, the crop was not nearly as good as usual.

TOMATOES—TEST OF VARIETIES.

Name of Variety.	Seedsman.	Date of First Ripe Fruit.		Yield of Ripe Fruit. — First two pickings		Yield of Ripe Fruit. — Balance of pickings		Total Yield of Ripe Fruit. — All pickings		Remarks.
				Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Bond's Early Minnesota	Gregory	Aug.	6	22	..	53	4	75	4	Medium size, regular, smooth, purple.
Key's Prolific	Vick	"	20	1	12	71	12	73	8	Small, scarlet, somewhat pear shaped.
Alpha	Gregory	"	18	11	6	60	..	71	6	Medium size, wrinkled, scarlet.
Baltimore Prize Taker	Landreth	"	9	13	2	54	14	68	..	Medium size, regular, smooth, purple.
Boston Market	Farquehar	"	17	4	11	59	..	63	11	Medium size, regular, smooth, scarlet.
Bright and Early	Vick	"	13	23	10	39	..	62	10	Below medium size, regular, smooth, scarlet.
Liberty Bell	Johnson & Stoke.	"	15	..	..	62	8	62	8	Above medium, regular, smooth, scarlet.
Essex Hybrid	Henders'n	"	20	..	15	61	..	61	15	Above medium size, regular, smooth, purple.
Nicholson's Early F'rcing	Farquehar	"	18	..	3	60	8	60	11	Below medium size, slightly wrinkled, scarlet.
Canada Victor	Graham	"	15	7	7	51	8	58	15	Medium size, smooth, scarlet.
Acme	"	"	15	7	12	50	..	57	12	Medium size, regular, smooth, purple.
Mayflower	Steele	"	20	1	2	56	4	57	6	Medium size, regular, smooth, scarlet.
Waldorf	Thorburn.	"	18	4	8	52	8	57	..	Medium size, regular, smooth, purple.
King Humbert	Dreer	"	7	1	10	54	12	56	6	Below medium, irregular, wrinkled, scarlet.
Autocrat	Thorburn.	"	20	1	14	54	4	56	2	Medium size, regular, smooth, purple.
Volunteer	Graham	"	18	..	15	54	15	55	14	Medium size, regular, smooth, scarlet.
Large Red Perfection	Thorburn.	"	20	1	9	54	4	55	13	Above medium size, regular, smooth, scarlet.
Maule's Earliest	Maule	"	4	2	11	53	..	55	11	Medium size, regular, slightly wrinkled, scarlet.
Burpee's Combination	Burpee.	"	20	..	10	55	..	55	10	Above medium, regular, smooth, scarlet.
Horsford's Prelude	Thorburn.	"	15	2	6	52	12	55	2	Small, regular, smooth, scarlet.
Best of All	Graham	"	13	6	6	48	4	54	10	Medium size, regular, smooth, scarlet.
Early Bermuda	Landreth.	"	14	16	7	37	12	54	3	Medium size, regular, wrinkled, scarlet.
Thorburn's Long Keeper	Thorburn.	"	20	..	5	53	4	53	9	Below medium, regular, smooth, purple.
Burpee's Climax	Burpee.	"	9	11	8	41	8	53	.	Medium size, regular, smooth, purple.
Matchless	Steele	"	16	..	..	52	4	52	4	Large, regular, smooth, scarlet.

SIX EARLIEST VARIETIES.

Name of Variety.	Seedsman.	Date of First Ripe Fruit.	Yield of Ripe Fruit. — First two pickings		Yield of Ripe Fruit. — Balance of pickings		Total Yield of Ripe Fruit. — All pickings		Remarks.
			Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Early Ruby	Steele	Aug. 2	2	14	47	8	50	6	Medium size, regular, smooth, scarlet.
Spark's Earliana	Johnson & Stoke.	July 28	18	14	28	4	47	2	Medium size, slightly wrinkled, scarlet.
Dominion Day	Bruce	Aug. 2	12	12	30	4	43	..	Above medium, wrinkled, scarlet.
Quicksure	Johnson & Stoke.	July 28	15	4	19	8	34	12	Medium size, regular, smooth, scarlet.
Early Leader	Vick	" 28	4	8	26	..	30	8	Medium size, wrinkled, scarlet.
Terrill's Early	Terrill	Aug. 4	7	11	22	12	30	7	Medium size, regular, smooth, scarlet.

SIX BEST YIELDING WRINKLED VARIETIES—AVERAGE FOR FIVE YEARS.

Name of Variety.	Average date of First Ripe Fruit.	Average Yield per Plant.		Remarks.
		Lbs.	Oz.	
Early Bermuda	Aug. 7	16	7	Medium size, regular, wrinkled, scarlet.
Money Maker	" 4	15	4	" "
Extra Early Jersey	" 4	14	5	" "
Early Richmond	" 5	14	1	Medium size, irregular, wrinkled, scarlet.
Democrat	" 5	13	4	Medium size, somewhat wrinkled, regular, purple.
Conqueror	" 2	13	2	Medium size, moderately regular, wrinkled, scarlet.

TWELVE BEST YIELDING SMOOTH VARIETIES—AVERAGE FOR FIVE YEARS.

Canada Victor	Aug. 3	15	1	Medium size, smooth, scarlet.
Baltimore Prize Taker	" 6	14	11	Medium, size, regular, smooth, purple.
Bond's Early Minnesota	July 31	14	9	" "
Brinton's Best	Aug. 12	14	6	Large, regular, smooth, scarlet.
Comrade	" 6	14	6	Medium size, smooth, scarlet.
Early Ruby	July 31	13	15	Medium size, regular, smooth, scarlet.
Mayflower	Aug. 6	13	12	Large, regular, smooth, scarlet.
Extra Early Advance	" 4	13	12	Below medium size, regular, smooth, scarlet.
Horsford's Prelude	" 5	13	12	Small, regular, smooth, scarlet.
Essex Hybrid	" 6	13	11	Above medium size, regular, smooth, purple.
Atlantic Prize	" 4	12	15	Medium size, smooth, regular, scarlet.
Autocrat	....	12	11	Medium size, regular, smooth, purple.

EXPERIMENTS WITH CORN.

Corn is such a popular vegetable that the varieties offered for sale by the seedsmen are being well tested. Last year, a list was published giving the results obtained from seventy-six varieties which were grown. This year seventy-two varieties were tested. In the following table will be found much data regarding the different sorts, there being recorded the name of the seedsman from whom the seed was obtained, the kind of corn, the date when it was fit for use in 1899 and 1900 ; the height in 1900 ; the average length of ears for 1899 and 1900, and the average yield for 1899 and 1900.

The soil in which the corn was grown this year was a light sandy loam on which tobacco, which was manured well, had been grown last year. It was ploughed in the

spring, disc-harrowed and harrowed twice with the smoothing harrow. The corn was planted on May 26, in hills three feet apart each way, the places having been previously marked by a corn-marker. About six kernels were planted in a hill. After germination had taken place and danger from cut-worms was over, the number of plants in a hill was reduced to four. Twelve hills of each variety were used for comparison. The corn was kept thoroughly cultivated during the summer, and when growth had ceased in the autumn it was cut and the ears removed and counted.

Owing to part of the soil being somewhat colder than the other, some varieties which were among the earliest to be fit for use in 1899 were later this year. On this account, the arrangement of early, second early, intermediate, and late sorts in the table was not changed and is the same as in 1899.

EARLY VARIETIES.

Name of Variety.	Seedsman.	Kind.	Fit for use, 1899.	Fit for use, 1900.	Height, 1900.		Length of ears, 1899.	Length of ears, 1900.	Average length of ears for two years.	Marketable ears from 12 hills, 1899.	Marketable ears from 12 hills, 1900.	Average number of marketable ears for two yrs.
					ft.	in.	in.	in.	in.			
Extra Early Beverly	Landreth	Hybrid	Aug. 12.	Aug. 9.	6	2	7	6	6½	31	51	41
Extra Early Cory	Steele	Sweet	" 15.	" 11.	5	0	6½	5½	6	60	53	56
Mitchell's Extra Early	Darch and Hunter	Flint	" 15.	" 13.	5	6	8	6½	7¼	59	49	54
Early Marblehead	Steele	Sweet	" 15.	" 12.	6	3	7	6	6½	52	48	50
Telephone Sweet	Salzer	"	" 15.	" 10.	5	6	6	6	6	49	45	47
Early Cory	Bruce	"	" 15.	" 11.	5	11	7	6	6½	42	48	45
Mammoth White Cory	Gregory	"	" 15.	" 10.	5	0	5	5½	5¼	35	32	33
Burbank's Early Maine	J. & Stoke	"	" 16.	" 11.	6	2	6	6½	6¼	59	54	56
Lackey's Early Sweet	Gregory	"	" 17.	" 11.	5	8	7	6	6½	56	48	52
Early Fordhook	Burpee	"	" 17.	" 10.	6	0	6	6	6	52	52	52
Quincy Market	Gregory	"	" 17.	" 12.	6	4	6½	6½	6½	51	46	48
Ford's Early	Ewing	"	" 17.	" 11.	5	10	7	7	7	49	52	50
First of All	Salzer	"	" 17.	" 13.	6	0	6	7	6½	34	39	36
Early Landreth Market	Landreth	"	" 18.	Sept. 6.	8	0	7	8½	7¾	38	55	46
Burpee's Earliest Sheffield	Burpee	Hybrid	" 19.	Aug. 29.	7	0	6	6	6	57	45	51
Adam's Extra Early	Rennie	Flint	" 19.	" 25.	7	6	7	7	7	42	49	45
Henderson's Metropolitan	Henderson	Sweet	" 19.	Sept. 3.	6	10	7½	7	7¼	48	48	48
White Cory	Thorburn	"	" 21.	Aug. 11.	5	10	7	6	6½	49	45	47
Manhattan Sugar	"	"	......	" 11.	4	6	....	4½	....	....	27	....
Moore's Early	Vick	"	......	....	7	0	..	6	....	....	29	....

SECOND EARLY VARIETIES.

Name of Variety.	Seedsman.	Kind.	Fit for use, 1899.	Fit for use, 1900.	Height, 1900.		Length of ears, 1899.	Length of ears, 1900.	Average length of ears for two years.	Marketable ears from 12 hills, 1899.	Marketable ears from 12 hills, 1900.	Average number of marketable ears for two yrs.
Kendall's Early Giant	Darch and Hunter	Sweet	Aug. 21.	Aug. 22.	6	0	7½	6½	7	43	40	41
Maule's XX Sugar	Maule	"	" 22.	" 22.	6	10	8	6	7	42	39	40
Champion Sweet	Darch and Hunter	"	" 22.	" 29.	6	6	7	6½	6¾	28	35	31
Crosby's Extra Early	Steele	"	" 23.	" 27.	6	6	6	6	6	50	69	59
Early Minnesota	"	"	" 23.	" 22.	6	2	7	7	7	31	47	39
Early Market	Rennie	"	" 24.	" 18.	5	11	7	6	6½	59	40	49
Early Giant Sweet	Steele	"	" 24.	" 20.	6	0	7½	6	6¾	52	37	44
Low's Perfection	Rennie	"	" 25.	" 31.	7	6	7½	8	7¾	59	71	65
Child's Honey Dew	Childs	"	" 25.	" 29.	6	7	7	7	7	54	46	50
Melrose	Thorburn	"	" 25.	" 27.	7	0	7	7	7	46	40	43
Boston Market	Darch and Hunter	"	" 25.	Sept. 8.	7	6	7	6	6½	44	35	39
New Champion	Salzer	"	" 25.	" 6.	7	2	7	8	7½	33	37	35
Pee and Kay	Darch and Hunter	"	" 26.	Aug. 31.	7	2	7½	6	6¾	52	27	39
Shaker's Early	"	"	" 26.	" 27.	8	10	8	9	8½	50	50	50

INTERMEDIATE VARIETIES.

Name of Variety.	Seedsman.	Kind.	Fit for use, 1899.	Fit for use, 1900.	Height, 1900. ft.	Height, 1900. in.	Length of ears, 1899. in.	Length of ears, 1900. in.	Average length of ears for two years. in.	Marketable ears from 12 hills, 1899.	Marketable ears from 12 hills, 1900.	Average number of marketable ears for two yrs.
Black Mexican	Ewing	Sweet	Aug. 28.	Sept. 9.	7	1	7	6½	6¾	71	67	69
Burlington Hybrid	J. & Stoke	″	″ 28.	″ 7.	9	0	8	7½	7¾	53	64	58
Stabler's Early	Henderson	″	″ 29.	Aug. 28.	8	0	8	8	8	39	57	48
Nonsuch	Bruce	″	″ 30.	....	7	10	8	8	8	30	46	38
Asylum Sweet	Thorburn	″	″ 30.	Sept. 8.	8	0	8	8	8	27	51	39
Tuscorora	Rennie	″	″ 30.	Aug. 29.	7	0	8½	7½	8	21	47	34
Moore's Early Concord	″	″	″ 31.	Sept. 6.	8	6	8	7½	7¾	44	50	47
Perry's Hybrid	Steele	″	″ 31.	Aug. 29.	7	10	7½	7½	7½	31	41	36
Russell's Prolific	Vick	″	″ 31.	......	8	6	9	8	8½	27	40	33
Amber Cream Sugar	Burpee	″	″ 31.	Sept. 8.	7	2	8	8½	8¼	22	53	37
Early Bonanza	J. & Stoke	″	Sept. 1.	″ 8.	7	6	7	8	7½	39	49	44
New Early Evergreen	″	″	″ 1.	″ 8.	7	8	7	7	7	38	29	33
New Honey Sweet	″	″	″ 1.	Aug. 31	7	2	7	7½	7¼	33	33	33
Roslyn Hybrid	Thorburn	″	″ 1.	Sept. 10.	8	6	8	8	8	38	62	50
Stabler's Nonpareil	Dreer	″	″ 1.	″ 10.	8	10	8	9	8½	33	40	36
Landreth's Sugar	Landreth	″	″ 1.	″ 10.	8	1	6½	7	6¾	29	42	35
Early Mammoth Sugar	Bruce	″	″ 1.	″ 12.	7	10	9	8½	8¾	27	48	37
Hickox Sugar	″	″	″ 1.	″ 10.	8	2	7	8	7½	26	42	34
Potter's Excelsior	Thorburn	″	″ 1.	″ 6.	7	2	6	7	6½	18	48	33
Henderson	Henderson	″	″ 1.	″ 12.	8	6	7	8	7½	14	39	26
Early Eight-rowed Sugar	Thorburn	″	″ 2.	″ 10.	8	11	8	8½	8¼	39	57	48
Zig Zag Evergreen	Ewing	″	″ 2.	″ 15.	8	10	7	6½	6¾	35	40	37
Squantum	Henderson	″	″ 2.	″ 6.	7	2	7½	7	7¼	29	43	36
Triumph Sugar	Thorburn	″	″ 2.	″ 10.	9	4	8	8½	8¼	23	55	39
New Champion Sugar	Ewing	″	....	Aug. 29.	6	4	....	7	...	....	35	....
Early Champion	Henderson	″	....	″ 27.	7	0	....	7	...	....	47	...

LATE VARIETIES.

Name of Variety.	Seedsman.	Kind.	Fit for use, 1899.	Fit for use, 1900.	Height, 1900. ft.	Height, 1900. in.	Length of ears, 1899. in.	Length of ears, 1900. in.	Average length of ears for two years. in.	Marketable ears from 12 hills, 1899.	Marketable ears from 12 hills, 1900.	Average number of marketable ears for two yrs.
Columbus Market	Livingston	Sweet	Sept. 4.	Sept, 16.	9	6	10	8	9	36	40	38
Bonanza Sweet	Gregory	″	″ 4.	″ 10.	7	8	7	8	7½	35	51	43
Shoe Peg	Ewing	″	″ 4.	″ 18.	8	2	6	7	6½	30	47	38
Extra Early Concord	Landreth	″	″ 6.	″ 8.	8	2	9	7½	8¼	32	48	40
Red Cob Evergreen	Steele	Dent	″ 6.	″ 13.	5	5	6	6	6	17	41	29
Egyptian Sweet	Rennie	Sweet	″ 7.	″ 12.	9	0	8	8	8	31	44	37
Ne Plus Ultra	″	″	″ 11.	″ 15.	8	0	8	7	7½	24	43	33
Country Gentleman	Henderson	″	″ 12.	″ 12.	7	9	7	7	7	44	58	51
Stowell's Evergreen	Darch and Hunter	″	″ 12.	″ 12.	9	1	7	7½	7¼	16	42	29
Mammoth Sweet	″	″	″ 12.	″ 19.	10	0	6	8	7	14	45	29
Old Colony	Burpee	″	″ 14.	″ 12.	8	1	6½	7	6¾	24	32	28
Original Stowell's Evergreen	J. & Stoke	″	....	″ 10.	9	0	....	8	....	....	46	....

PEASE—EXPERIMENT FOR COMPARISON OF YIELDS AND QUALITY.

For the past three years a large number of varieties of garden pease have been tested in the Horticultural Department. In 1899 there were 157 varieties under test, and notes were taken on their relative earliness, productiveness and quality. The length to which the vines grew was also ascertained. From the 157 varieties that were tested, twenty-seven were noted as being the most promising, quality and yield being two of the most important points taken into consideration when judging their merits. This year it was decided to test these varieties in larger plots. Unfortunately, Heroine and Telephone, two good sorts were omitted in this trial. Cleveland's First

and Best and Alaska, two very early, smooth kinds of not the best quality, were included in the test to compare the earliness of the others with them.

Twelve hundred selected pease of each variety were sown in drills 100 feet long and 2½ feet wide on May 10 and 11. The pease germinated well and a fine stand was obtained. As each variety became ready for use, the date was recorded and the yields of green pods from the several pickings were also kept. The following table shows the results obtained from this experiment.

By referring to the Farmers' List of Best Vegetables on another page, the varieties recommended will be found.

PEASE—TEST OF VARIETIES.

Name of Variety.	Ready for Use.	Number of Pickings.	Total Yield of Green Pods.	Length of Vine.	Quality.
Early.			Quarts.	Inches.	
Gregory's Surprise	June 29	3	20	18 to 22	Very good.
Cleveland's First and Best	July 1	3	26	20 " 22	Medium.
Alaska	" 2	2	24	24 " 28	"
Station	" 3	2	22	18 " 21	Very good.
Premium Gem	" 4	3	36	24 " 28	"
Chelsea	" 4	4	31	12 " 16	"
Nott's Excelsior	" 4	2	23	12 " 15	"
Child's Morning Star	" 4	2	19	30 " 34	"
Exonian	" 4	2	20	24 " 26	Good.
American Wonder	" 5	2	22	15 " 20	Very good.
Second Early.					
Nott's New Perfection	" 9	3	33	22 " 26	Very good.
Gradus	" 9	2	29	28 " 32	"
English Wonder	" 9	3	26	16 " 20	Good.
Medium.					
McLean's Little Gem	" 12	3	36	34 " 40	Very good.
McLean's Advancer	" 14	3	38	30 " 34	"
Burpee's Quantity	" 17	2	47	34 " 38	Good.
Late.					
Dwarf Telephone	" 19	3	40	22 " 26	Very good.
Startler	" 19	2	41	38 " 42	"
McLean's Prolific	" 21	2	62	36 " 40	Good.
Yorkshire Hero	" 21	2	36	30 " 34	Very good.
New Victory	" 22	2	52	38 " 42	Good.
Champion of England	" 23	2	60	60 " 66	Very good.
Boston Wrinkled	" 23	2	54	48 " 52	Good.
Eugenie	" 23	3	50	48 " 54	"
Juno	" 23	2	44	30 " 34	"
Stratagem, Improved	" 24	1	36	28 " 32	Very good.
Veitch's Perfection	" 31	2	38	60 " 66	Good.

TOBACCO.

Fifty-six varieties of tobacco were grown this year, but there was not time to prepare a table for this report showing the results obtained from them. The yields from six good varieties, however, which were grown on larger plots, have been ascertained and the results are herewith given. The land where this tobacco was grown was a good sandy loam, which had been ploughed in the autumn of 1899. In the spring the soil was given a liberal top dressing of rotted barn-yard manure, which was ploughed under, and then the land was disc-harrowed once and harrowed once with

the smoothing-harrow. The seed was sown in the hot beds on April 11, the young plants pricked out into a cold frame on May 22, and planted in the field on June 11, at a distance of 3 x 3½ feet apart. The surface soil was kept cultivated until there was danger of breaking the leaves on the plants. The plants were cut on September 7, being fully matured at that time. They were hung in the tobacco house until dry, and then stripped and the leaves put in hands preparatory to fermenting them.

TOBACCO—TEST OF VARIETIES.

Name of Variety.	Number of Plants.	Weight of 1st Grade.	Weight of 2nd Grade.	Weight of 3rd Grade.	Total Yield per Acre. All Grades.	Condition when Cut.
		Lbs.	Lbs.	Lbs.	Lbs.	
White Burley	511	67½	51¾	39¼	1,286	Ripe.
Improved White Burley	470	59	69¾	20	1,313	"
Zimmers' Spanish	483	33½	59½	33¼	1,086	"
Pryor Blue	385	45	64	28½	1,482	"
Small Havana	495	49½	65	15	1,085	"
Little Oronoka	474	43	62	15½	1,055	"

ARBORETUM AND BOTANIC GARDEN.

The Arboretum and Botanic Garden continues to increase in usefulness and improve in appearance every year. The collection of trees, shrubs and herbaceous perennials is now very large and in many genera few additional species and varieties can be procured. The list of trees and shrubs being tested here, which was published last year, has given much satisfaction and there are many requests for it. It was reported in that list that up to the time of its publication 3,071 species and varieties of trees and shrubs had been tested, of which 1,465 were hardy, 330 half hardy, 229 tender, 307 winter-killed and 740 had not been tested long enough to admit of an opinion being given as to their hardiness. Since the list was published, still further additions have been made. The collection of perennials has also been much increased during the past few years, and it is hoped that in the near future a list will be published of them also.

This year was a favourable one for the trees, shrubs and plants. Though the tenderer things were injured by winter, as usual, it was not exceptionally severe, and the summer being moist nearly everything made good growth. While the grounds were kept in fairly good order during the season, more help is necessary to keep everything in good condition.

In the limited space which may be devoted to the Arboretum and Botanic Garden in the annual report, it is not possible to describe many of the plants which are being grown there, but each year the object has been to present descriptive lists of the very best things. In the report for 1897 a list was published of one hundred of the best ornamental trees and shrubs, and also one hundred of the best herbaceous perennials. In 1898 a supplementary list of good perennials was given, and in 1899 a descriptive list of twenty-five of the best low-growing flowering shrubs and an additional list of good perennials. This year it was thought that a list of the best climbing plants would prove acceptable.

SOME GOOD WOODY CLIMBERS.

There are many homes which could be made much more attractive looking by the judicious use of a few good vines. A house which lacks any pretence of beauty in architecture may have much of the stiffness taken from it by planting a vine where it will break the monotony of a straight wall. Verandahs, summer houses, fences, rocks and old stumps of trees covered with vines will so change the appearance of a place that it will hardly be recognized by one who has known it before. There are so many good hardy native climbers that it is not necessary to go to any expense in procuring something which will produce the desired effect. In the following list some of the best of those described are natives. Climbers usually make rapid growth when once established. The best results will be obtained, however, by preparing the ground well beforehand. Usually the soil about buildings is poor, and if such be the case it will well repay any one to remove it where the vines are to be planted and replace it with some of a good loamy character, thoroughly mixing well rotted manure with it. If such preparation is given the results will almost certainly be satisfactory.

Aristolochia Sipho—Dutchman's Pipe.—Although the Dutchman's Pipe is not as hardy as some vines, it is grown with fair success here. Before beginning to make rapid growth, however, it requires two or three years to become established. The leaves are large, heart-shaped and deep green. This vine, though quite attractive, has a heavier look than some others, and is more in keeping with a massive building than with one of a lighter style. It twines about whatever object comes within reach and does well on a trellis or verandah. The flowers, which are partially hidden by the large leaves, are brown and of peculiar shape, much resembling a Dutchman's pipe. It is a native of the eastern United States, and grows from 20 to 30 feet high.

Celastrus articulatus—Japanese Climbing Bitter-sweet.—This is just as attractive, if not more so, as the native species. The berries are smaller, but more abundant, and there is a greater contrast in colour between the outside and inside of the fruit than there is in *Celastrus scandens,* the colour in this case being yellow and orange. It is a native of Japan, a rapid grower and a very desirable vine.

Celastrus scandens.—Climbing Bitter-sweet, Wax-work.—Next to the Virginian Creepers and Virgin's Bower, this is probably the best native climber that we have. It is a very rapid grower, with pretty bright green leaves, and highly ornamental fruit. It is very suitable for training over summer houses and verandahs, and twines about everything it can get hold of. In procuring this vine, one should be certain that he is getting one which produces both male and female flowers, as some vines have only male blossoms, and in such cases no fruit is produced and much of the beauty of the vine is lost, as the fruit is quite attractive and hangs on most of the winter. The berries are of an orange colour until they are cracked open by frost, when the interior, which is scarlet, is revealed.

Clematis Jackmanni.—The large flowered Clematis are well represented by this superb variety, which is one of the best of them. The flowers are very large and rich, violet purple in colour, with a velvety appearance. It is a very free bloomer and remains in flower for several weeks. Where a strong colour effect is desired this is a good plant to use. There are now many varieties of large flowering Clematis, and a good range of colour can easily be obtained.

Clematis ligusticifolia—Western Virgin's Bower.—This species is a native of the North-west Territories and British Columbia, and while it may not prove as satisfactory in the east as *C. virginiana,* it should prove very valuable when cultivated in those parts of Canada where it is native. The leaves are smooth and glossy, and are

more attractive than the ordinary Virgin's Bower. The flowers are numerous, small and white, and the vine looks very beautiful in midsummer, when it is in full bloom.

Clematis paniculata—Japanese Clematis.—No climber introduced in recent years has proved as satisfactory and as beautiful as this one. It is not as hardy as *C. virginiana*, but it is much finer when in bloom. The flowers are larger than *C. virginiana*, *C. ligusticifolia* or *C. Vitalba*, and are much whiter. This attractive vine does not bloom until autumn, and is at its best during the month of September, when other kinds have gone to seed, at which time it is a perfect mass of attractive white, sweet-scented flowers. It kills back considerably every winter, but the growth is so rapid in the spring that this is not a great disadvantage, unless one desires to have a large surface covered, when *C. virginiana* is better.

Clematis virginiana—Virgin's Bower.—Next to the Virginian Creepers, this is the most satisfactory native climber to plant, and the most satisfactory where the former are troubled with thrips. It is a very rapid grower, and soon covers anything it is planted near. It clings by tendrils, and should have something to which these can fasten. The leaves are of a lively green colour and of graceful form. About midsummer the small greenish white male flowers come into bloom, and these are produced in such abundance that the vine is fairly covered with them. The female flowers are also attractive.

Clematis Vitalba—Traveller's Joy.—A European Clematis which very much resembles *C. virginiana*. It is a rapid grower and quite hardy. Where it is more convenient to get this species than the native one it may be planted with the certainty that it will give good satisfaction.

Lonicera hirsuta—Hairy Honeysuckle.—The honeysuckles make good climbers, and this native species should be particularly valuable in the colder parts of the country, and as it grows naturally as far west as Lake Superior, it will probably prove hardy anywhere in Ontario or the Province of Quebec. It is a profuse bloomer, being covered with rich yellow flowers during part of June. Unfortunately, it does not, like *L. sempervirens* and *L. Periclymenum*, continue blooming during the summer. It is very attractive when the vine is kept compact, as the flowers are then more massed together, and show off to better advantage.

Lonicera Periclymenum—English Honeysuckle, Woodbine.—Though not quite as hardy as the next species; this honeysuckle will succeed very well if it is not too much exposed. It blooms about the middle of June, and the flowers are bright pink outside and yellow within, and have an agreeable spicy odour, which makes it a desirable vine for planting by or near the house.

Lonicera sempervirens—Scarlet Trumpet Honeysuckle.—A very attractive climbing honeysuckle, blooming almost continuously from the first week of June until late in autumn. The profusion of bright, scarlet, trumpet-shaped flowers produce a fine effect when it is trained against a house or wall. It is a native of the Eastern States, and is quite hardy at Ottawa.

Lycium chinense—Chinese Matrimony Vine.—This is a graceful climbing shrub which is very useful for covering rocks, stumps of trees, or anything else where a tall growing vine is not required. Neither the leaves nor flowers are particularly ornamental, but the graceful habit of the plant commends it, together with the fact that in the autumn the bright scarlet fruit gives it a very attractive appearance. There is a variety, *macrocarpum*, which is an improvement on the ordinary form, in that the fruit is larger, and hence more conspicuous. The ordinary Matrimony Vine, *L. europaeum*, is a desirable climber also, but it is not so good as *L. chinense*, as the fruit is much smaller.

Vitis inconstans (*Ampelopsis Veitchii*)—Japanese Ivy.—The Japanese Ivy is not thoroughly satisfactory in Ontario and Quebec, as it kills back more or less every year, and sometimes is killed out altogether. In the warmer parts of these provinces, however, it may be grown with fair success. It is a beautiful vine and clings so tightly to the wall on which it is trained that it is unsurpassed in this regard. The leaves also are of an attractive green colour in summer, and at times are highly coloured in autumn. When grown, a north or west side of a building is the best site. Many make the mistake of putting it on the south side. While this cannot always be avoided, a place where it is not much exposed to the sun is better. It appears to be the thawing and freezing of the vine in early spring which often has such an injurious effect upon it. This injury is not as great on a north or west exposure. For the first year or two this vine should be protected in winter until it gets well established. Something which will not readily absorb the heat should be chosen for this purpose. Straw is a very good material to use, if held in place by something else.

Vitis quinquefolia (*Ampelopsis quinquefolia*)—Virginian Creeper.—This fine climber has several points of merit which commend it to those who desire a hardy, graceful, attractive vine. It is a rapid grower, and being a native of Ontario and Quebec, is perfectly hardy. Its glossy, green leaves become very brilliant in autumn, when they assume many shades of red. Although it has tendrils by which it clings if there are crevices into which they can be inserted, it will not cling to a wall where there are not such places, and has to be supported in some other way. It is very desirable for training over summer houses, fences, verandahs, and even on walls, where it falls in graceful festoons and becomes very attractive. Unfortunately, it is much subject to thrip, and while there is a remedy in whale oil soap, tobacco water, and kerosene emulsion, they have to be applied very persistently. Where there is a good circulation of air or where the vines are often moved by the wind, the thrip is not so troublesome.

Vitis quinquefolia hirsuta—Self-fastening Virginian Creeper.—The advantages of this vine over the ordinary Virginian Creeper are so great, in certain respects, that it should be grown in preference to the latter if a vine is desired for covering a wall. This variety has smaller leaves than the ordinary species, and while those of the latter are quite smooth and shiny, those of the former are downy on both sides. The tendrils of *hirsuta* are short and furnished with large discs, by means of which this vine clings to a brick or stone wall almost as tenaciously as the Japanese Ivy. It is much neater looking than the ordinary form, and needs practically no attention as regards training. The leaves colour about as highly at Ottawa as the common Virginian Creeper. This variety may be found growing wild in the woods in the vicinity of Ottawa, and has also been noticed in the Eastern Townships of Quebec.

Vitis riparia—Riverside or Sweet-scented Grape.—The grape vine makes a highly ornamental climber, as it is a rapid grower and very graceful. This native species has the great advantage of being perfectly hardy and of having very highly perfumed blossoms. The male and female flowers of this species are borne on different vines, and if the delicious perfume is to be had one with male flowers must be planted. One drawback to the wild grape being used as a climber near the house is that it is subject to the attacks of thrips, which disfigure the leaves very much. In exposed places, however, where there is a good circulation of air, they will not be so troublesome.

The Wistarias and Actinidias are also good climbing shrubs where they can be grown successfully. The former have bloomed at Ottawa, but they are not very satisfactory, except in the mildest parts of the province of Ontario.

ANNUAL CLIMBERS.

In addition to the shrubby and perennial climbers in the foregoing list, there are some fine annuals which may be used with good effect, of which the sweet pea and nasturtium furnish an abundant supply of lovely flowers for cutting for many weeks

during the summer. The following are those which will be likely to give the greatest satisfaction:—

Sweet Pea.—The sweet pea is one of our most popular flowers, and justly so. For variety of colour, delightful perfume and continuity of bloom it is difficult to surpass. Unfortunately, there are many who do not grow this beautiful flower who might if they would. The chief requisites to successful sweet pea culture are early planting, plenty of moisture and good drainage. These are all nearly equally important. Sweet pease should be planted as soon as the ground is dry enough in the spring, as this will give the plants a chance to root properly before warm weather sets in, and also give the roots an opportunity of getting down into the moist, cool soil. A week or two of delay in planting will result, as a rule, in much poorer flowers. A site should be chosen where the vines will get full sunlight most of the day. This is important. Well rotted manure should be dug in and well mixed with the soil the previous autumn. This will usually give better results than manuring the soil in the spring, as there is danger of making the ground too loose and dry. A trench should be made about five or six inches wide and four inches deep. The pease should then be sown rather thinly along the bottom of it. An ounce of seed to a row thirty feet long is considered a fair amount. The seed should now be covered with about two inches of fine soil. If much more is put on, the plants will not come up as readily. After they are about six inches high the trench may be filled level with the soil, the object being to get the roots well down, but if there is danger of the ground drying out, the trench and each side of it may be covered with hay, straw or leaves, which will act as a mulch and help to keep the soil cool and moist, and the rain will be caught in it. The brush or trellis should now be put down. If this is delayed the vines will be injured when attempting to train them.

The surface soil should be kept loose with a hoe during the summer, as this will encourage growth and help to retain the moisture in the ground. It is well worth the trouble to water sweet pease if the soil is not naturally moist, as the flowers will be larger and there will be more of them. Sweet pease should begin to flower during the first week in July, and there should be a continuous succession of bloom until severe frost in the autumn. To keep them blooming, however, it is very necessary to prevent the flowers from going to seed and to keep the soil moist. If all the flowers are not desired or cannot be disposed of, those not wanted should be nipped off.

There are a great many varieties of sweet pease offered for sale, and it is puzzling to many to know which to choose. Most people, however, buy mixed seed, not knowing what varieties they are getting. These are not as satisfactory as named varieties. The following eighteen sorts, which give a good variety of colour, are recommended as being among the best:—

Blanche Burpee, Countess of Powis, Lottie Hutchins, Lady Mary Currie, Prima Donna, Prince of Wales, Improved Salopian, Lady Grisel Hamilton, Navy Blue, Triumph, Edward of York, Stanley, Golden Gleam, Coquette, Aurora, Ramona, Maid of Honour, Mrs. J. Chamberlain.

Nasturtium.—Next to Sweet Pease, Nasturtiums are the most satisfactory annual climbers that furnish flowers for cutting. Like Sweet Pease, a continuous succession of brilliantly coloured flowers may be kept up from early summer until late autumn. The soil in which Nasturtiums are planted should not be very rich or the plants will run to vine rather than flowers, and this is not desirable. A site should be chosen where the vines will be exposed to full sunlight most of the day, as Nasturtiums bloom better so situated. The seeds should not be sown as early as Sweet Pease, as they are liable to rot when the ground is cold. It should be planned to have the young plants coming up about the third week of May. If they appear earlier, there is danger of their being injured by frost. The soil should be well prepared by digging and raking, and the seed sown about 2 inches apart and from 1 to 2 inches deep. After the young plants are well established, they should be thinned to from 5 to 6 inches

apart. The surface soil should be kept loose during the summer to encourage the growth of the vines and retain moisture in the soil. Nasturtiums need more care in training than Sweet Pease, as they have no tendrils to cling with.

Nasturtiums are very effective, as the leaves are bright green and the flowers of such lively shades of yellow, brown and crimson that the contrasts are very fine. If planted where they may be trained over any objects about the grounds suitable for the purpose, they make a very pleasing effect.

There are two strains of climbing nasturtiums which are much grown, the first known as Lobbianum, and the second as Tall Nasturtiums. The former have smaller flowers, but are more profuse bloomers than the latter; but both are good. Some fine colours may be obtained by planting the hybrids of Madame Gunter. Good mixed seeds will be found quite satisfactory.

Variegated Japanese Hop.—The so-called Japanese hop, is an annual, and this is a variety of it. It is one of the most rapid-growing vines that can be planted. Part of the leaf is almost pure white and part gray, making the contrast with the remaining green portions very effective. The seed should be sown early in the spring and the plants thinned out well after they are large enough for the variegations of the leaf to be distinguished. Some plants are more variegated than others and have the white parts of the leaf whiter, and these should be left. The seed should be pinched off when they form, as they rather spoil the otherwise fine effect of the vine.

Scarlet Runner.—Though old-fashioned, the scarlet runner is still one of the most attractive of annual climbers. It is such a free bloomer that the effect produced by the scarlet flowers is very good. The seed should be sown when there will be no danger of frost after the young plants appear above ground.

Morning Glory.—This is another old-fashioned flower, but one which deserves a place, where there is room for it. The seed should be sown early in spring, if the best results are to be obtained. The Imperial Japanese Morning Glories, which were introduced a few years ago, are larger than the ordinary kind and more brilliantly coloured.

Cobaea scandens.—Although this vine is a perennial, it can only be treated as an annual when grown outside, as it winter-kills. To get good results, the Cobæa should be started in a cold frame and planted out in the open towards the end of May or about June 1, it being very tender. It makes a rapid and luxuriant growth during the summer and comes into bloom towards the latter part of the season. The flowers are about 2 inches in diameter and are greenish white or purple, according to the variety planted. The purple flowering variety is the best, as the vine has purple stems, making the contrast with the leaves better. The flowers, also, are prettier than the white ones. Unfortunately, the season of this vine is not long, as it is killed by the first frosts of autumn.

Madeira Vine.—This is another old favourite which must be treated as an annual. The root should be planted in the spring, after danger of frost is past. The growth of this pretty climber is very rapid, and it will cover a large surface during the summer. Its thick, bright green leaves are the chief attractions of the plant. In the autumn, the roots should be taken up and stored for the winter.

Canary Bird Vine—Tropaeolum canariense.—This is a very pretty climber which bears an abundance of small bright-yellow flowers, which fancy may compare to a bird with wings half extended. It is a rapid grower and soon runs over the trellis, lattice-work, or other object which is placed for its support. The seeds should be sown early.

There are a large number of other annual climbers, but those just described are among the best. Among these are the gourds, which are quite attractive. When trained over fences, the varied shape and colour of the gourds, which are produced in abundance, give an odd appearance to the vine.

Central Experimental Farm, Ottawa. Nitrogen and Water Analysis Laboratory.

Central Experimental Farm, Ottawa. Main Chemical Laboratory.

REPORT OF THE CHEMIST.

(Frank T. Shutt, M.A., F.I.C., F.C.S., F.R.S.C.)

Ottawa, December 1, 1900.

Dr. Wm. Saunders,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the fourteenth annual report of the Chemical Division of the Experimental Farms.

The work of the past year has been of an exceedingly varied character, investigations relating to many special branches of agriculture and the solution of problems affecting farming in different parts of the Dominion, being undertaken. In addition to this class of work, direct assistance has been given by the analysis of typical representative samples sent in by farmers. Time, however, has not allowed us to satisfy all the demands made in this connection, for we recognize that original research must have the first claim upon our attention.

In the following paragraphs a brief account of the matters above referred to is given.

Soils.—Samples representative of a large area in the vicinity of New Westminster, B.C., occupied by a number of fruit-growers and market gardeners have been submitted to analysis. The results are accompanied by suggestions regarding the best means to supply the soil's deficiencies.

Soils from the Experimental Station of the North-west Territories, at Calgary, Alta., collected from virgin and cultivated areas, as well as from irrigated and non-irrigated lands, have been carefully examined, and several interesting features revealed in connection with the effect of irrigation.

A cultivated sandy loam from the neighbourhood of Annapolis, N.S., has also been analysed and reported on.

Many samples of soil have been sent in by farmers, but since they only received a partial analysis no account of them has been recorded in the report.

Valuable results in the conservation of soil moisture by summer fallowing, obtained from an investigation carried on from May to November with samples collected monthly on the Experimental Farms at Brandon, Man., and Indian Head, N.W.T., are recorded. The exceptional character of the season this year in the North-west afforded specially favourable conditions for the prosecution of this research, and as a result we are able to publish data of a most instructive order.

We have also been able to trace the course of nitrification throughout the summer in these North-west soils, though there are doubts, owing to the great drought in the early part of the season, as to whether the results obtained should be considered as normal.

Fertilizers.—Information as to the agricultural value of marl, woollen waste, wood ashes, from samples examined in the laboratories is given.

Foods and Feeding Stuffs.—Under this caption many interesting chapters will be found. Rape as a forage plant is being widely introduced. The prominence that this crop has received recently made it desirable to ascertain its feeding value at different stages of growth. This has accordingly been done and is now reported on.

The relative feeding value of certain varieties of mangels, carrots, turnips and sugar beets has been determined and tabulated.

Various milling by-products, such as bran, cotton-seed meal, cocoa-nut meal, corn meal, &c., have been submitted to analysis and accounts regarding them are to be found in the present report.

Certain comparatively new and important legumes have been examined as to their feeding value. Several of these, as far as is known, have not previously been analysed, and consequently the information gained will be of peculiar interest.

A number of samples of sugar beets have been tested as to their sugar content and purity. These were received from the Manitoba Government, Winnipeg, from the Experimental Farms at Brandon and Indian Head, from the North-west Irrigation Company, Lethbridge, Alta., and from Prince Edward Island. The data are accompanied by conclusions as to the value of the beets for sugar making purposes.

Wheats.—A comparative study of the well-known Red Fife wheat with certain cross-bred wheats has been made. These latter, originated by Dr. Saunders, are the Percy, Stanley and Preston, and were obtained by crossing the Red Fife with earlier ripening sorts, chiefly from Northern Russia. The close relationship of these wheats with the parent Red Fife is obvious from an examination of the data.

A rumour being prevalent that wheat of the crop of 1899 contained an excessive amount of moisture, thus impairing its keeping qualities, a number of moisture determinations were made, the samples being furnished by Mr. D. Horn, Chief Grain Inspector, Winnipeg. The results show that the moisture was not excessive or abnormal.

Insecticides and Fungicides.—Various compounds, such as Arborine, Harvesta, Canadian brands of whale oil soap, &c., have been examined and their general composition, with remarks as to their probable effectiveness, given.

Well Waters from Farm Homesteads.—This useful work has been continued and the results of those samples submitted to complete analysis during the past year are appended in tabular form, together with deductions as to their relative purity.

Correspondence.—From December 1, 1899, to November 30, 1900, 1,126 letters were received, and 1,453 despatched.

Tuberculin.—The tuberculin supplied to the Dominion Veterinary Surgeons has been prepared and forwarded, as formerly, from the Farm laboratories. During the twelve months ending November 30, 1900, 20,903 doses, as against 17,179 doses in the year previous, have been sent out.

Soft Pork Investigation.—As may be well known, we have been engaged during the past eighteen months on a research, the object of which was to ascertain the cause or causes of 'softness' in pork. A preliminary report, giving many of the results obtained to date, appeared in our last year's report. The analyses in connection with the first feeding trials were completed last June, the carcasses of 187 pigs having been examined and chemical and physical data of the fatty tissue, taken from the shoulder and from the loin, obtained. Many of the results were of such a striking character that it was thought desirable to make a second feeding trial which would include most of the important rations of the first trial, in addition to others of a slightly modified character. This second series of experiments was commenced in the early months of the present summer, 102 pigs being placed in pens of 6 each, under the varying conditions of the trial. Of these animals, in the neighbourhood of 60 have to date been slaughtered and analysed. The data so far are strongly corroborative of those obtained in the first series, and there can be no doubt but that we shall be in possession at the close of this experiment (which will be in about two months' time) of very satisfactory and reliable information regarding the effect of various food stuffs on the quality of pork.

The amount of laboratory work in connection with this research has been enormous, but the growing importance of the English export bacon trade—both to farmers and pork packers—may be urged as a justification for the exceedingly large though necessary expenditure of time. Already the investigation has yielded important and valuable results (see pages 151 to 155 Report for 1899), and there is every probability that still more valuable deductions may be drawn from the data at the close of the present experiments. It is proposed to publish these conclusions in bulletin form, as soon as the laboratory work is finished, which, as we have said, will be in about two months' time.

Samples Received for Analysis.—In the following schedule we furnish the number and indicate the character of the samples received during the past year for examination and report:—

SAMPLES Received from Farmers for Examination and Report, November 30, 1899, to December 1, 1900.

Samples.	British Columbia.	North-west Territories.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.	Number still awaiting examination.
Soils	12	38	39	8	7	2	8	1	115	33
Mucks, muds and marls	....	....	....	8	1	3	4	8	24	9
Manures and fertilizers	....	....	....	3	4	....	2	3	12	5
Forage plants and fodders	...	13	37	29	3	2	2	1	87	11
Well waters	3	7	11	34	8	8	4	....	75	......
Miscellaneous, including dairy products, fungicides and insecticides	1	2	8	6	8	2	5	3	35	13
Total	16	60	95	78	31	17	25	16	348	70

Acknowledgments.—Naturally, with the ever increasing work of the Division, more and more of that which is purely analytical falls to the lot of the assistant chemists. The past year, as evidenced by this report, not to speak of the very large number of analyses that have been made in connection with the soft pork investigations, has been an exceedingly busy one, and I am consequently more than ever indebted to my assistants for their valuable aid.

Mr. A. T. Charron, B.A., First Assistant Chemist, has continued to discharge his duties with fidelity and skill. From the date of his appointment, Mr. Charron has taken a keen and intelligent interest in agricultural research and investigations, and has afforded me most valuable help in the work of this Division.

To Mr. H. W. Charlton, B.A.Sc., Second Assistant Chemist, my thanks are also due. He has been most assiduous in his work, all of which has been characterized by care and thoughtfulness, and I am pleased to bear testimony to his good services.

The clerical labours involved in carrying on the various parts of our work is now very considerable. It includes stenographic and typographic and secretary work in general, in addition to the calculation and posting of analytical results. In all of this we have had the help of Mr. J. F. Watson, who, as in former years, has earned my thanks for a careful and painstaking performance of his duties.

I have the honour to be, sir,
Your obedient servant,

FRANK T. SHUTT,
Chemist, Dominion Experimental Farms.

CANADIAN SOILS.

BRITISH COLUMBIA.

New Westminster.—A sample of the surface soil, together with its underlying subsoil or hard-pan, representing the character of the soil on the peninsula formed by the Fraser river and Burrard inlet, have been submitted to careful and complete analysis. The examination was undertaken with a view of rendering assistance to the fruit-growers, market-gardeners and farmers in the neighbourhood of New Westminster, who had found considerable difficulty in profitably working this soil. The collection of the soils was made by Mr. W. J. Brandrith, Secretary B. C. Fruit-growers' Association, New Westminster, who, speaking of the samples, under date of February 20, 1900, says:

'No. 1 is a virgin soil; it has never been disturbed by the hand of man, but thirty years ago a very destructive fire swept over the whole district. The timber had been chiefly cedar; a second growth of red fir, poplar and willow is now growing. The depth of soil to the hard-pan varies from 6 inches to 5 feet, and averages about 2 feet 6 inches. The soils were taken from lot 25, group I., N. W. district, municipality of Burnaby, and distant about 27 chains from the northern boundary of New Westminster. It is a very fair sample of the soil of the whole peninsula formed by the Fraser river and Burrard inlet.

'No. 2 is from the hard-pan underlying No. 1. It has been exposed to the air, but not to the rain, since September 26, 1899.

'No. 3 is from the hard-pan, taken from a depth of 2 feet in the hard-pan, or 5 feet from the surface of the soil.'

Analysis and Report—No. 1.—The soil has all the appearance of a light, sandy loam. It contains a considerable amount of gravel and small pebbles, as well as of undecomposed root fibre. Tested with litmus paper, it gives a strong acid reaction. After preparation, the fine earth (which in the air-dried condition is of a greyish-red colour) was submitted to analysis.

Nos. 2 and 3 are light grey in colour. They consist of firmly-cemented masses, chiefly of sand, with pebbles intermixed. To the eye there is no indication in either of them of humus, and they have the appearance of being exceedingly poor and refractory.

ANALYSIS of Soils (water-free), Municipality of Burnaby, B.C., 1900.

Number.	Soil.	Organic and Volatile Matter	Clay and Sand.	Oxide of Iron and Alumina.	Lime.	Magnesia.	Potash.	Phosphoric Acid.	Soluble Silica.	Carbonic Acid, &c., (undetermined).	Total.	Nitrogen.	Available.		
													Potash.	Phos. Acid.	Lime.
1	Surface	9·00	77·98	11·65	0·35	1·26	0·12	0·13	0·12	......	100·61	·148	·0088	·0049	·0039
2	Hardpan, 2 feet from surface	4·07	82·14	11·56	0·70	1·18	0·15	0·13	0·09	......	100·02	·041	·0062	·0173	·0490
3	Hardpan, 5 feet from surface	3·60	82·75	11·22	0·36	0·65	0 16	0·13	0·08	1·05	100·00	·028	.....	.....	.....

No 1.—Surface soil. The chief constituents to consider are potash, phosphoric acid, and nitrogen and lime. Our previous work on Canadian soils would show that good examples from uncultivated areas will, as a rule, contain from ·25 to ·50 per cent potash, from ·15 per cent to ·25 per cent phosphoric acid, from ·15 per cent to ·2 per cent nitrogen, and from ·5 per cent upwards of lime. Many of our richest

soils have given numbers far larger, but these may fairly represent the limits exhibited by soils of good, medium quality. The amounts of potash, phosphoric acid and lime designated in the table as available are those obtained by digesting the soil with a one per cent solution of citric acid in the cold. English results seem to justify the assumption that less than ·01 per cent of phosphoric acid, so obtained, indicates the soil's need of phosphatic manure. With regard to the available potash, Dr. Dyer, who showed that the acidity of root sap was approximately equal to the afore-mentioned solvent, says that when such potash falls below ·005 per cent, potash fertilizers would prove valuable. Judged by these standards, we are obliged to confess this soil as considerably below the average in all its important elements, save perhaps in available potash.

Humus and Nitrogen.—It is extremely doubtful if commercial fertilizers could be used profitably on this soil unless supplemented, or rather preceded, by organic manures. When the store of humus has been increased, the soil will be more retentive of and responsive to such plant-food as may be supplied in chemical fertilizers, and further it will be warmer and furnish a more comfortable medium for seed germination and root extension. Barnyard manure, naturally, stands first in importance as a source of soil humus; it would be difficult to overestimate the value of this manure for soils such as we are discussing. Not only for its organic matter, is it to be recommended; as a supplier of nitrogen and a considerable amount of mineral matter in a more or less available condition, it has a distinct value.

Unfortunately, in the majority of cases, especially where there is a considerable area tilled, there is not a sufficiency of manure, and it then becomes of the highest importance to know what can be most economically used as a substitute. Where swamp muck occurs, this material may be utilized, first being piled and allowed to dry out and then fermented as in the compost heap, either with manure or with lime or wood ashes. The air-dried muck may be employed as an absorbent in the cow stable, pig-pen, &c., to absorb the liquid manure. In this way a double purpose is served—the valuable liquid portion of the manure, which might otherwise be lost, is retained, and the fertilizing elements in the muck set free. Good samples of air-dried muck will contain from 65 per cent to 85 per cent organic matter, and from 1·25 to 2·5 nitrogen.

Possibly the only feasible plan of furnishing humus and nitrogen over large areas is by the turning under of a growing crop of clover or some other legume. This is termed green manuring, and is certainly to be regarded as the most economical and one of the quickest methods of replenishing the soil's humus. The benefits to be derived from green manuring, especially when a legume is used, have so repeatedly been set forth in our past reports that it may not be necessary to speak at any length on that subject. It is well to emphasize, however, in this connection, three points: first, if the soil is too poor to grow clover, buckwheat or rye, may be ploughed under for a year or two and the land thus made suitable for clover; secondly, that a dressing of wood ashes or a fertilizer containing potash and phosphoric acid will very much help the clover, and, thirdly, there will be no practical enrichment of the soil with nitrogen, unless a legume is used, since the legumes only have the ability (by the means of certain germs that reside in nodules on their roots) to appropriate and store up the free nitrogen of the air.

Lime.—The analytical data show that this soil is by no means rich in lime, and its well marked acidity accentuates this fact. The land evidently stands in need of lime, not only as a source of plant food, but to correct that sourness which is injurious to most farm crops. Since it is not wise to make heavy applications of lime, and since this element has the tendency to work or wash down into the subsoil out of the reach of the roots, the application of, say, 20 bushels per acre every second or third year, will prove better practice than a larger dressing at greater intervals. If phosphoric acid is applied in the form of Basic slag, much less lime than that indi-

cated will be necessary, since that fertilizer contains a considerable proportion (usually 12 per cent to 15 per cent) of free lime.

Shallow culture, i.e. shallow ploughing with an occasional loosening, but not bringing to the surface, of the subsoil is to be advised for this and similar soils. It seems desirable owing to its light and hungry character to keep the humus, lime and other fertilizers as far as possible in the first 4 or 5 inches of soil. A deep tilth is undoubtedly a feature of great value, but it can scarcely be economically produced and retained in very light and sandy soils. For further details as to the economical improvement of poor and exhausted soils, the reader is referred to the report of this Division for 1899, page 133, et seq.

Commercial Fertilizers.—In the question of commercial fertilizers it will only be possible to indicate the general principles to be followed, since the nature of the crop to be grown and the past history of the field must necessarily be taken into consideration before definite formula for any specific purpose can be suggested. The following remarks, however, may be useful :—

Nitrogen.—Of the commercial forms of organic nitrogen in British Columbia, fish-waste prepared from the offal of the canning factories, sometimes known as fish-meal or fish-pomace, holds a high place. Its composition will vary according to the parts of the fish that predominate in its preparation ; thus, some samples may contain between 2 and 3 per cent of nitrogen, and 10 to 15 per cent of phosphoric acid, while others possess 5 to 7 per cent of nitrogen and 2 to 3 per cent phosphoric acid. This fertilizer, it is obvious, may be used to supply two of the three elements generally necessary, but should be supplanted by a potash manure—such as Kainit, muriate of potash, or wood ashes.

We may regard it as a concentrated and quick acting manure, best used as a top dressing or applied to the ploughed land and lightly harrowed in before seeding. It has been applied with success to grain crops and grass lands especially, and gives the greatest returns on light, warm, well-drained loams. For an ordinary dressing, a mixture of 500 pounds of fish-meal and 100 pounds of muriate of potash per acre is suggested.

Nitrate of soda and sulphate of ammonia furnish large amounts of readily assimilable nitrogen. Undoubtedly the former, considering the character of the soil, will be the better; for acid soils and soils deficient in lime sulphate of ammonia may do positive harm. From 100 pounds to 200 pounds per acre may be applied in several applications (at intervals of a few weeks) as a top dressing during the earlier months of growth. The great solubility of nitrate, points to the advisability of never applying it save when there are growing plants to make use of it, and the economy of several small dressings, rather than one large one at the opening of the season.

Phosphoric Acid.—Bone meal, superphosphate and basic (Thomas) slag are the chief phosphatic fertilizers obtainable, leaving out of consideration fish pomace, already referred to. Bone meal is a source of nitrogen also, containing from 2·5 to 4·0 per cent of this element. Its phosphoric acid is not immediately assimilable, but becomes so gradually in a soil that is warm, moist, and well drained. It is probably better suited for grass lands and orchards than for crops with a short season of growth. The usual application lies between 300 and 500 pounds per acre.

Owing to the sourness of the soil of this tract and its deficiency in lime, the writer is of the opinion that basic slag, finely ground, would be found a very useful source of phosphoric acid. It contains in the neighbourhood of 17 per cent phosphoric acid, and 15 per cent free lime. Its application may be from 300 to 500 pounds per acre. Such excellent results have been obtained from this fertilizer in Germany and England, that it would appear to be well worth trial, especially on soils similar to those we are now considering. Further information regarding basic slag will be found in the report of this division for 1898.

Potash.—Unfortunately, it appears that wood ashes—a most valuable source of this element—are not purchasable in British Columbia.

To those in proximity to the coast, sea-weed will prove a cheap and valuable manure, since it contains considerable amounts of potash and nitrogen. Unless well dried, it would scarcely pay to freight sea-weed any distance inland, and in any case it is advisable to allow the sea-weed to lose a portion of its water before hauling to the farm.

Kainit, muriate of potash and sulphate of potash are potassic manures imported from Germany. Kainit contains about 12 per cent actual potash ; muriate and sulphate about 50 per cent actual potash. These fertilizers should always be bought on guaranteed analysis.

The average application of the muriate and sulphate is 100 pounds per acre ; of the kainit, about 400 pounds per acre. As the winter season in this district is always more or less open and rainy, the writer is of the opinion that sp.ing application of these fertilizers would prove the most profitable.

Most poor and exhausted soils usually respond best to a complete fertilizer ; that is, one that contains all three of the elements of plant food—nitrogen, phosphoric acid and potash. The proportion of each of these most economical to use must, however, be largely determined by the character of the crop to be grown, the nature of the past manuring and the results of careful experimenting on the soil with the crop under consideration. The amounts we have given in this report are those commonly employed ; more specific instructions require a knowledge of the circumstances. Those desiring further information on this subject are invited to place themselves in correspondence with this division.

NORTH-WEST TERRITORIES.

In August, 1899, samples of soil from the north-west quarter, section 21, township 23, range I, west of the fifth meridian, were received from the Commissioner of Agriculture for the North-west Territories, with a request for their analyses. Upon this tract of land the agricultural experimental station of the North-west Territories is situated (Calgary), and the location from which the samples were collected is the bench land of a valley falling away from the banks of the Elbow. Mr. Chas. W. Peterson, Deputy Commissioner of Agriculture, North-west Territories, writing of the soils, says that the valley at this point is about one mile in width, that a few poplars are appearing on the bench, and that cotton-woods and spruces are growing well on the river bottom. The soil from Plot 1 (*see* table of analyses) 'has been cultivated for a long time and is full of weeds.' The soil of plot 2 is 'virgin prairie, and well fitted for either cultivation or grazing.' Plots 1 and 2 are closely adjacent areas.

Two further samples from the North-west government, and collected on south-west quarter section 15, township 23, range 1, west of fifth meridian, were forwarded in December, 1899. Writing of these soils, Mr. Peterson says that : 'One (plot 3 in table) is taken from dry, unirrigated land, fifty feet from upper side of irrigation ditch, while the other (plot 4 in table) is taken from irrigated land, 50 feet from lower side of irrigation ditch and 100 feet from the foregoing sample. The surface soil on this area is from 2 to 6 inches deep, and the general character of the locality may be described as rolling prairie. Stunted poplars grow on south side of the valley, which is an old water course, 1,000 feet wide. Under irrigation it would make very good grazing land and produce fair crops of grain.'

All the foregoing surface soils were accompanied by their sub-soils, but, unfortunately, time did not permit the examination of the latter.

ANALYSIS of Soils (water-free), North-west Territories, 1900.

Plot.	Locality.	Organic and Volatile Matter.	Clay and Sand.	Oxide of Iron and Alumina.	Lime.	Magnesia.	Potash.	Phosphoric Acid.	Soluble Silica.	Carbonic Acid, &c. (Undetermined).	Total.	Nitrogen.	Available. Soluble in 1% Citric Acid. Potash.	Phosphoric Acid.	Lime.
1	NW. ¼ Sec. 21, T. 23, Rg. 1, W. 5th Mer.	18·61	73·05	6·32	1·08	0·35	0·44	0·25	0·02	....	100·12	0·660	·0320	·01069	0·592
2	NW. ¼ Sec. 21, T. 23, Rg. 1, W. 5th Mer.	13·69	76·71	7·69	0·71	0·43	0·52	0·21	0·01	0·03	100·00	0·530	·0349	·00928	0·498
3	SW. ¼ Sec. 15, T. 23, Rg. 1, W. 5th Mer.	16·12	76·56	6·30	0·99	0·90	0·38	0·24	0·08	....	101·48	0·549	·0279	·00390	0·440
4	SW. ¼ Sec. 15, T. 23, Rg. 1, W. 5th Mer.	15·30	75·52	6·39	1·28	0·98	0·38	0·18	0·05	....	100·08	0·574	·0353	·01201	0.568

Plot No. 1.—Surface soil, marked 'Cultivated': It has the appearance of a rich loam of good tilth and one capable of yielding good crops when supplied with a sufficiency of water. It is quite black from the presence of organic matter and presents very many features in common with the fertile, black loam of the prairie.

Plot No. 2.—Surface soil, marked 'Virgin prairie': Very similar in appearance to that of Plot 1, but its organic matter is more fibrous and consequently less humified.

Since in all essential particulars these soils are of the same nature and character, it will be of advantage to discuss their data together.

Both soils may be considered as light to medium loams, sand predominating, rich in plant food and especially so in organic matter and nitrogen. Tested with litmus paper, neither show acidity or alkalinity. A careful examination proves the absence of all deleterious and alkaline matter.

We cannot be said as yet to have established standards of fertility for Canadian virgin soils, but from the examination of a number of such soils we have arrived at certain limits between which most good agricultural soils are to be found. These limits as regards nitrogen, potash, phosphoric acid and lime, are discussed at length in the report of this Division for 1897, and in brief on pages 148, 149 of the present report. A reference to these figures and to the data presented in the foregoing table gives evidence of the excellent quality of both of these soils; they are undoubtedly well supplied in all the essential elements of plant food, a very fair proportion of which appears to be in a more or less immediately available condition.

Though the soil from Plot 1 is stated to be cultivated, and from Plot 2, as virgin prairie, a comparison of their data does not reveal any exhaustion of fertility in the former due to cropping; indeed, in several important features No. 1 is the better of the two. In potash only is No. 2 the richer. It is quite possible that these soils were not originally identical; but whether such be the case or not it is quite evident that they do not serve to illustrate that truth of which we have in past reports brought forward several instances, namely, that there is a marked decline in both 'total' and 'available' plant food, due to successive cropping in cases where no form of manuring has been practised.

A special inquiry in regard to these soils was with respect to their richness in lime. Though not ranking with calcareous soils, they certainly show a very fair percentage of this constituent and probably at present quite sufficient for the best returns. There is no reason to suppose that the herbage would be deficient in this element or that cattle and horses grazed thereon would be lacking in bone-forming elements. Evi-

dently the lime is not altogether in what might be termed a locked up condition, the percentage available being large. The ratio of the available to the total lime is the same for both soils.

Irrigated and Non-irrigated Soils.

The chief object in examining soils from Plots 3 and 4 was to ascertain what effect irrigation might have had upon the plant food present, sample No. 3 being from an unirrigated and No. 4 from an irrigated area.

In general appearance these samples are similar to Nos. 1 and 2—black loams of loose texture in which sand predominates. They both show a fair amount of fibre. No. 3 (not irrigated), is neutral to test paper ; No. 4 (irrigated), is very slightly alkaline.

The following deductions may be made from the chemical data : In 'total' potash the soils are alike ; in 'available' potash No. 4 is slightly the richer. In 'total' phosphoric acid, No. 3 is higher than No. 4, but the amount of this element immediately available in the latter is four times that in No. 3. Whether the greater proportion of available potash and phosphoric acid in No. 4 soil may be due to irrigation is not by any means clear, but the fact is worthy of note and deserving of further investigation. In nitrogen the percentages are almost identical. The irrigated soil (No. 4) shows a somewhat larger amount of lime, which may be due to the deposition of lime from the irrigation water, or more possibly brought up from the lower soil by capillarity induced by increased surface evaporation consequent upon irrigation. It will be noticed that the ratio of the 'available' lime to the 'total' lime is practically the same for both soils.

These, like Nos. 1 and 2, are soils of more than average fertility. Though not so heavy as the wheat lands of the prairie further east, they will undoubtedly give excellent yields, providing the climatic conditions, under which term we may include the water supply, are propitious.

NOVA SCOTIA.

From Annapolis county.—A sample of soil representative of much in the vicinity of Annapolis was submitted to us for examination and report. Messrs. T. S. and R. R. Bohaker, of Granville Ferry, N.S., in forwarding the soil say : 'We have several orchards planted on soil similar to the sample sent and they have not given us entire satisfaction for several years past. We are desirous of knowing what element is lacking, so that we may supply the deficiency and get the trees into better bearing. Would salt or lime be of value to this soil, and if so, in what quantity should they be applied? What other manures or fertilizers would you recommend ? Information on these points should be useful to a number of people in our neighbourhood.' This soil in the air-dried condition presents the appearance of a brownish-red, sandy loam. Its analysis shows it to be of much better quality than might be supposed from a casual inspection. The data are as follows :—

Analysis of Soil (air-dried).

Moisture	2·97
Organic and volatile matter	15·22
Mineral matter insoluble in acid	68·28
Lime	·26
Magnesia	·50
Oxide of iron and alumina	12·44
Silica (soluble)	·09
Phosphoric acid	·25
Potash	·37
	100·00
Nitrogen, in organic matter	·491

In potash, phosphoric acid and nitrogen, the foregoing data show it to be equal to the average fertile soil. Provided the season were favourable, especially as regards moisture, it should prove quite productive. It is to be remarked, however, that this soil has a decided acid reaction, and shows a deficiency in lime. This condition may account in a large measure for the poor returns spoken of by Messrs. Bohaker, for it has been abundantly demonstrated of late years that a sour condition, which is always associated with traces only of available lime compounds, is strongly detrimental to farm crops in general. An application of 30 to 40 bushels of lime per acre is, therefore, suggested as likely to bring about a more productive condition of the soil.

Since the soil contains but little clay, and consequently has a low absorptive capacity for moisture, it would be important from time to time that it should be replenished with organic matter, either by an application of manure or a green crop, such as clover, turned under. For maintaining the humus and nitrogen of orchard soil, there is, perhaps, no better or more economical plan than sowing clover in July and ploughing under during May of the following year, after which cultivation, to preserve a dry earth mulch, and thus prevent surface evaporation, should be practised until the clover is again sown. For field crops which allow of soil cultivation, such as corn and roots, this mechanical method for retaining soil moisture should not be neglected.

To enhance fertility by means of commercial fertilizers, we would suggest for the orchard and fruit trees generally a brand containing, say, 2 to 3 per cent nitrogen, 6 to 8 per cent available phosphoric acid, and 8 to 10 per cent potash—the application being from 300 to 500 pounds per acre. If it is desired to purchase these constituents separately, phosphoric acid may possibly be best applied as Thomas (Basic) slag. This fertilizer contains usually from 14 to 17 per cent of phosphoric acid, which, though present in a form not so immediately available as that in superphosphate, is better adapted to sour soils by reason of its alkalinity. Basic slag contains some 15 per cent of free lime, and hence neutralizes or counteracts acidity. The application may be 300 pounds per acre. Finely ground bone meal is also a good source of phosphoric acid for moist, warm soils of good texture. For potash, if wood ashes are not procurable, muriate of potash or kainit may be employed. Of muriate, 100 pounds per acre, and of kainit, 400 pounds per acre, is the usual dressing. Being an acid soil, nitrate of soda would be better than sulphate of ammonia to use as a source of nitrogen. The application may be from 100 to 150 pounds per acre, broadcasted in two or three dressings, say, of 50 pounds each, at intervals throughout the growing season. The nitrate can be mixed with several times its weight of dry loam to facilitate distribution.

For light and sandy soil, spring application of fertilizer is preferable, being spread on the ploughed land and lightly harrowed in. When nitrate of soda is used, it is furnished while vegetative growth is active, as already indicated.

CONSERVATION OF SOIL MOISTURE.

Experiments at Brandon, Man., and Indian Head, N.W.T.

We may, I think, confidently assert that among the problems to be solved in connection with agriculture in Manitoba and the North-west Territories that which seeks to secure and retain soil moisture for the use of the growing crop, is one of the most important. As yet, the necessity of returning plant food in manures and fertilizers is not generally felt, so rich is the soil over very large areas; but nevertheless there are elements, largely variable and uncertain, that have a most marked effect upon the yield. These elements or factors are chiefly two—rainfall and early frost. It is with the first of these, or rather the retention of the rain, that our present research has to do. The wheat yield of any year depends, as we well know, to a very large extent

upon the climatic influences that have prevailed throughout the season—and to a certain degree upon those of the preceding season.

The value of a moist seed bed for the germinating grain and an ample precipitation during May and June, is well known to all farmers in the North-west. This becomes the more apparent when we remember that an acre of wheat requires more than 300 tons of water to bring it to perfection, and that especially is the moisture necessary during the earlier stages of the wheat's growth.

Now, though it is obviously impossible for the farmer to control the rainfall, it is quite practicable and within his power, by proper methods of culture, to store up a large portion of the season's precipitation for the use of the crops of the succeeding year. To obtain data that might serve to corroborate this statement we commenced an investigation last spring on fallowed and cropped lands on the Experimental Farms at Indian Head, N.W.T., and Brandon, Man.

The plan of the investigation may be stated as follows :—Early in the spring on each of the farms two areas having as far as possible soil of a similar character were selected, the one (A) intended to be fallowed during the present season, and which had been cropped in 1899; the second area (B) to be cropped, but which had been fallowed in 1899. Samples from each of these areas were taken, month by month, from May to November inclusive, to two depths—the first (No. 1) representing the upper 8 inches; the second (No. 2), the depth from 8 to 16 inches. These samples, taken in special canisters, were immediately on collection forwarded to the laboratory. On their arrival each canister of soil was at once weighed and its contents thoroughly mixed, sampled, and the moisture determined in duplicate. From the average weight of the canister of water-free soil (obtained from the seven monthly determinations) and the percentage of moisture, the amounts of water in tons and pounds per acre were calculated. The canisters (2½ inches by 8 inches) used were very stout and open at both ends. In taking the samples they were thrust into the ground until level with the surface and then removed with the aid of a sharp spade, and covered with deep and close-fitting caps. To prevent any possible evaporation en route, 'electric' tape was used to cover the edge of the cap or lid where it fitted over the canister.

Before discussing the results obtained, it will be of interest to consider in outline the general conditions as regards rainfall that prevailed in 1899, as well as this year. Mr. Bedford, writing of the season of 1899 at Brandon, says: 'May was unusually wet and cloudy, with a low temperature, and seeding was frequently interrupted by rain. Rain was abundant during early June, followed by bright, warm weather later in the month. The temperature and rainfall during July and August was about normal. The fall months were unusually dry.' The total rainfall was 11¼ inches.

Regarding the season of 1900, Mr. Bedford says: 'There was no rainfall previous to May 11, the date when the first samples were taken, and the soil was exceptionally dry.' On May 26, he wrote: 'it still holds very dry here.' In a letter dated June 13, Mr. Bedford states: 'the weather has been exceedingly dry so far; in fact, we have bad practically no rain of any value. This is very unusual with us, as our annual rains generally occur during the last half of May and the first two weeks of June. Our crops and suffering severely from the want of rain.' Under date of June 28, he says : 'It continues exceedingly dry here, and the grain has suffered terribly throughout the province.' On July 13, he writes: 'Between three and four inches of rain has fallen, and the soil is pretty well saturated. The wheat has improved somewhat, and there is a prospect of more than half a crop of coarse grain.' In a letter on August 14, he says: 'The rainfall during the past month has been 2·37 inches, which is unusually heavy for this time of the year.' Again on September 12, he says: 'The rainfall for the past month has been 5·34 inches, which is much heavier than we generally have at this season of the year.'

From the foreging, it is obvious that while the season of 1899 was characterized by a plentiful but normal precipitation, that of 1900 was exceptional and abnormal, it

being exceedingly dry during the earlier months of the summer and more than usually wet during the middle and later months of summer.

The records from the Indian Head Farm show that in 1899 the rainfall was fairly normal, the total precipitation being 9·44 inches, of which 1·35 inches fell in May, and 5·34 inches in June.

Of the present season, Mr. Mackay records similar weather conditions to those already stated for Brandon. Thus, on May 8, he writes: 'The weather for the past three weeks has been very dry and warm, with high winds prevailing almost every day.' On June 8, he says: 'We are having very bad, windy weather, with no rain of any use,' and then in September he states: 'We are having unusually wet weather and the outlook for grain still unstacked is far from bright.' Speaking of the season as a whole, Mr. Mackay writes, November 28, as follows:—'The past season has not been an average one for the test. The weather was too dry in May and June, and then in July, August and September it was unusually wet, causing the soil in Plot B with the growing crop to become much more moist than it otherwise would.'

The treatment of the soils may be summarized in the following statement:—

Brandon, Plot A.—In fallow 1900, was ploughed June 7 to a depth of 7 inches, the surface was cultivated with harrows and scuffler sufficient to keep down the weeds during the balance of the season.

Plot B.—In crop 1900, was ploughed on May 12, and sown the same day, and the crop harvested August 24; the yield was 32½ bushels of oats per acre. It was not ploughed after harvesting.

Indian Head, Plot A.—In fallow 1900, ploughed 8 inches deep between April 17 and 25; cultivated 2 inches deep four times, once each in May, June, July and August.

Plot B.—In crop 1900, ploughed 6 inches deep between June 1 and 15, 1899, cultivated 3 inches deep 3 times during July and August of that year, ploughed end of August 6 inches deep, but not ploughed or cultivated before seeding this year. Seed sown April 30. Grain harvested August 14, 1900.

The rainfall during the investigation, at Brandon and Indian Head, is tabulated as follows:—

Brandon, Man.	Inches.	Indian Head, N.W.T.	Inches.
May 11 to June 11	0·14	May 8 to June 8	1·08
June 11 to July 11	4·46	June 8 to July 8	1·85
July 11 to Aug. 11	2·37	July 8 to Aug. 8	2·44
Aug. 11 to Sep. 11	5·34	Aug. 8 to Sep. 8	2·83
Sep. 11 to Oct. 11	4·15	Sep. 8 to Oct. 8	3·81
Oct. 11 to Nov. 11	0·32	Oct. 8 to Nov. 8	0·10
Total	16·76	Total	12·11
NOTE—There was no rainfall previous to May 11.		NOTE—The rainfall previous to May 8 was 0·27 inches.	

TABLE I.—MOISTURE: Percentage and Amount per Acre:—In Soils at Brandon and Indian Head, 1900.

BRANDON, MANITOBA.

Date of Collection.	"A." In Fallow, 1900. In Crop, 1899.				"B." In Crop, 1900. In Fallow, 1899.			
	No. 1. (1 to 8 ins.)		No. 2. (8 to 16 ins.)		No. 1. (1 to 8 ins.)		No. 2. (8 to 16 ins.)	
	Moisture.		Moisture.		Moisture.		Moisture.	
	p. c.	Amount Per Acre.	p. c.	Amount Per Acre.	p. c.	Amount Per Acre.	p. c.	Amount Per Acre.
1900.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs		Tons. Lbs.
May 11..	19·45	214 877	18·24	212 1780	25·55	325 216	22·92	301 1470
June 11..	17·40	187 247	18·30	231 106	20·63	246 519	23·00	303 286
July 11..	25·88	310 366	22·35	296 1896	26·80	366 161	23·27	307 1579
Aug. 11..	26·73	325 497	23·62	319 107	22·38	273 305	12·72	167 260
Sept. 11..	27·47	335 1335	21·62	285 1649	27·79	364 1323	21·31	274 1685
Oct. 11..	25·40	302 878	20·68	269 139	26·73	345 1329	20·54	262 622
Nov. 11..	27·43	335 1054	23·79	320 862	25·65	326 1597	20·96	280 184

INDIAN HEAD, N. W. T.

Date of Collection.	"A." In Fallow, 1900. In Crop, 1899.				"B." In Crop, 1900. In Fallow, 1899.			
	No. 1. (1 to 8 ins.)		No. 2. (8 to 16 ins.)		No. 1. (1 to 8 ins.)		No. 2. (8 to 16 ins.)	
	Moisture.		Moisture.		Moisture.		Moisture.	
	p. c.	Amount Per Acre.	p. c.	Amount Per Acre.	p. c.	Amount Per Acre.	p. c.	Amount Per Acre.
1900.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.		Tons. Lbs.
May 8...	22·03	264 260	21·32	276 1627	25·87	385 1320	25·55	324 1371
June 8...	23·52	287 1028	17·81	219 1860	26·76	341 37	26·68	344 513
July 8...	24·39	301 1188	22·38	292 1166	23·62	288 1281	18·35	212 1217
Aug. 8...	24·78	307 1860	19·28	242 916	25·05	311 1745	19·07	222 1774
Sept. 8...	24·16	297 1585	21·65	280 948	21·28	252 628	20·50	243 1732
Oct. 8...	25·26	315 1912	22·39	292 1729	27·60	355 1605	22·07	267 1886
Nov. 8...	25·79	324 1652	22·83	300 654	26·14	330 353	23·35	288 436

TABLE II.—MOISTURE:—Amount per Acre to depth of 16 inches.

Date.	Brandon, Man.				Date.	Indian Head, N.W.T.			
	A. Fallowed, 1900. Cropped, 1899.		B. Cropped, 1900. Fallowed, 1899.			A. Fallowed, 1900. Cropped, 1899.		B. Cropped, 1900. Fallowed, 1899.	
1900.	Tons.	lbs.	Tons.	lbs.	1900.	Tons.	lbs.	Tons.	lbs.
May 11.	427	657	626	1,686	May 8	540	1,887	700	691
June 11.	418	353	749	805	June 8........	507	888	685	550
July 11..	607	1,262	673	1,740	July 8........	594	354	501	498
Aug. 11......	644	604	440	565	Aug. 8	550	776	534	519
Sept. 11....	621	984	639	1,008	Sept. 8......	578	533	496	360
Oct. 11.........	571	1,017	607	1,951	Oct. 8........	608	1,641	623	1,491
Nov. 11.....	655	1,916	606	1,781	Nov. 8	625	306	618	789

Considering first the data obtained on the Brandon soils, it is to be noticed that the soil in fallow last year (B) contained, during May, June, and July of the present year, both in the first and second eight inches more moisture than soil to corresponding depth from the area that was cropped last year. This will be more apparent by consulting Table II., from which the following results are obtained :—

	Tons.	Lbs.
May 11, 1900, excess of moisture in land fallowed, 1899, per acre	199	1,029
June 11, 1900, excess of moisture in land fallowed, 1899, per acre..........................	331	452
July 11, 1900, excess of moisture in land fallowed, 1899, per acre..........................	66	478

Between June 11, and July 11, the large excess of moisture previously present in soil (B) fell off rapidly, and was reduced to between 60 and 70 tons per acre. This in all probability was due to two causes ; the first, the greater absorptive and retentive power of soil (A)—in fallow 1900—to hold the rainfall of the month 4·46 inches (see table), and secondly, the large moisture requirements of the growing crop on soil (B). These factors continued evidently in a more marked manner from July 11, and August 11, so that at the latter date a reversal of the previous conditions had taken place and the soil in plot A now contained 204 tons moisture more than that in plot B. The draught by the growing grain on the moisture on this latter plot would be at its maximum this month—a fact that well explains our results.

Leaving out of consideration the data of plot A for October—regarding which we cannot at present offer any explanation—it will be observed that there is a constant tendency for the soil moisture in both fallowed and cropped soil during the latter months of the experiment to approximate. This is evidently due to the unusual wet autumn (see table of rainfall), the evaporation being slight. However, results show that on November 11, when the last samples were collected, the fallowed soil contained about 50 tons of moisture per acre more than in the cropped soil, the evaporation from the latter naturally being greater. Under more normal conditions we might, judging from our early results, expect a much larger excess of moisture in the fallowed soil.

Turning to the Indian Head samples, we find a similar condition during the early months of the season as at Brandon. Thus, the moisture in the fallowed land of 1899, over and above that of cropped land of that year was as follows :—

	Tons.	Lbs.
May 8, 1900, excess of moisture in fallowed land of 1899......	159	804
June 8, 1900, excess of moisture in fallowed land of 1899......	177	662

The July analyses give data in the same direction as those of August for Brandon, namely, less moisture in soil B (cropped 1900). The causes, we may suppose, are the same as those already indicated as exerting an effect at Brandon, the lighter rainfall at Indian Head accounting for the earlier appearance of the deficiency in soil moisture in the cropped land. This condition continued to prevail throughout July, August, and September, as seen by consulting Table II., from which the subjoined data are calculated :—

	Tons.	Lbs.
July 8, 1900, excess of moisture in fallowed land of 1900, per acre......	92	1,859
August 8, 1900, excess of moisture in fallowed land of 1900, per acre......	16	257
September 8, 1900, excess of moisture in fallowed land of 1900, per acre......	82	173

During the last two months of collection, the moistures in the cropped and fallowed soils, as in the case of the soils at Brandon, tend to approximate, but showing in the last determination, as also observed in the Brandon soils, a slight excess of moisture in the land fallowed during the present year.

The foregoing are without doubt most instructive and valuable data. The season, especially the earlier part, was a particularly favourable one for the investigation ; the drought that prevailed during the spring and early summer months emphasizing in a most marked manner the beneficial effect of the previous year's fallowing. It is exceedingly satisfactory to note that the results at both points of observation are in so large a measure confirmatory of one another, and that they afford such strong evidence of the value of fallowing as a means of storing up moisture for the crop of the succeeding year.

Further work another season when climatic conditions of a more normal character prevail, must be done. In addition to a repetition of the tests here presented, it is proposed to include the determination of moisture in soil growing the second crop after fallow, for it seems the practice of sowing grain on stubble land—quite a common one—often results in failure when the rainfall of the season is light.

NITRIFICATION IN NORTH-WEST SOILS.

Nitrification is the term applied to the process whereby the organic nitrogen of the soil is converted into nitrates—compounds which are the source of available nitrogen to crops. It is carried on in the soil by certain germs or micro-organisms which flourish on the humus or nitrogenous vegetable matter, providing conditions of warmth and moisture are favourable and a salifiable base, as lime, is present.

The warm, moist months of summer is when nitrification goes on most rapidly. But it is, nevertheless, essential to the best results that the growing grain should have access to an ample supply of this soluble nitrogenous food at a period in the spring or early summer, when frequently nitrification is but tardy. During such a

period, the young plants must rely largely on the nitrates produced the previous season. Unfortunately for the agriculturist, nitrates are extremely soluble compounds and consequently are washed down out of the reach of the roots of the young plants, if heavy rains have prevailed the previous autumn or winter.

On the supposition that there was excessive leaching of the nitrates from the surface soil in the North-west during the autumn and winter months, it has been suggested by an English agricultural writer that an application of nitrate of soda in the spring to the growing grain would be of much value and greatly increase the yield. While this may be true in part in certain, what we may term, exceptional seasons, as the past one—which was characterized by a heavy rainfall in the late summer months—it is not, in all probability, the case usually, for in Manitoba and the North-west Territories the rains of the year, as a rule, are during the latter part of May and in June, and the autumn is fair and dry. Further, the winters are usually very cold and dry, and consequently not conducive to leaching. To this we may add, the soils generally over the wheat-growing areas are a heavy clay loam of a retentive character.

Be this as it may, it was thought desirable to determine from month to month the amount of nitrates in the surface soils (1 to 8 inches) already referred to as examined for their moisture content. The method adopted was to weigh out 100 grams of the fresh soil and add thereto 1,000 c.c. of ammonia-free distilled water and shake the mixture well for one hour. It was then allowed to settle for one hour and the free ammonia in an aliquot part at once determined. A further quantity was at the same time set aside in contact with a zinc-copper couple (by means of which nitrates are reduced to ammonia) and at the expiration of twenty-four hours distilled. From the free ammonia in the distillate the amount previously found deducted and the remainder calculated to nitrogen, and recorded as nitrogen in nitrates in one million parts of the water-free soil. The results are set forth in the subjoined table :—

NITROGEN in Nitrates and Nitrites—Results recorded in parts per million of water-free soil.

Date.	Brandon, Man.		Date.	Indian Head, N.W.T.	
	In Fallow, 1900. In Crop, 1899.	In Crop, 1900. In Fallow, 1899.		In Fallow, 1900. In Crop, 1899.	In Crop, 1900. In Fallow, 1899.
1900.			1900.		
May 11	10·62	11·45	May 8	3·37	16·22
June 11	15·21	28·20	June 8	6·93	25·70
July 11	10·99	7·65	July 8	22·30	20·00
Aug. 11	17·94	8·42	Aug. 8	22·70	17·20
Sept. 11	10·67	5·51	Sept. 8	16·71	7·20
Oct. 11	4·55	7·91	Oct. 8	12·20	7·32
Nov. 11	2·53	6·40	Nov. 8	3·99	3·97

In considering the foregoing data, it would be well to keep constantly in mind that in two very important features the season of 1900 was abnormal in the North-west—an unusual drought in early summer and an exceptionally heavy rainfall in the autumn months. Under these conditions, we may suppose the loss of nitrates during the late autumn was greater than is ordinarily the case.

Brandon.—Soil in fallow 1900. With certain minor fluctuations, which I think may be accounted for in a large measure by the rainfall, the amount of nitrates keeps up until the early part of September, when it rapidly falls, evidently owing to the heavy rains already referred to, which washed the nitrates beneath the first 8 inches of soil. It has already been remarked that the season of 1899 was more or less normal in character, and it is probably from this fact that the soil in May possessed such a fair amount of nitrates. The largest amount was obtained in the sample taken August 11, no doubt due chiefly to the moisture that fell the preceding month promoting the nitrification process.

On the soil cropped in 1900 we find, as might be expected, a falling-off after the June sample was collected, due undoubtedly to the wheat crop making its draught upon this nitrogenous food.

Indian Head.—Soil in fallow 1900. This soil, probably owing to a very favourable physical condition, gave large amounts of nitrates throughout the summer, but these, as in the case of the Brandon soils, rapidly fell off during October from the cause we have advanced.

Soil in crop 1900. The soil, similarly, was richer in nitrates than the corresponding Brandon sample, but in a general way showed the same falling-off as the season advanced, due to the crop's requirements.

It is to be confessed that the present investigation gives support to the view that the nitrates are largely lost to the surface soil during the late autumn months, but whether this occurs in normal seasons to the extent here indicated is very doubtful. Further work is necessary to determine this point. It seems clear, however, that fallowing encourages the development of the nitrates.

FERTILIZERS.

MARL.

This material consists essentially of carbonate of lime, but considerable amounts of organic matter, sand and clay, frequently are present. It occurs in beds of varying thicknesses in old lake and pond bottoms, and on the margins of many existing bodies of water, showing their former extension. Usually it is overlaid with peat or swamp muck. It has arisen from the breaking down of countless fresh-water shells, many of which, however, still retain their form, and thus give the name shell marl to the deposit. It is very widely distributed in Canada, samples from beds of marl from almost every large area in the Dominion having been examined in our laboratories. The better and purer marls of Ontario are now being largely used for cement-making.

Considered agriculturally, marl must be regarded rather as an amendment than a fertilizer ; improving the tilth, neutralizing acidity and promoting nitrification, are amongst its chief functions, though it has a distinct value as a supplier of lime (an element of plant food) for soils deficient in that constituent.

The application of marl is especially to be recommended for heavy, plastic clays, for very light soils deficient in lime, and for those in which humus predominates. It renders the tilth of the former mellower, allowing air to permeate the soil and the roots to spread more easily ; its addition improves sandy soils, by making them heavier and more retentive of moisture and fertilizing materials. In the slow oxidation of the

organic matter of peaty soils, it aids in the conversion of their nitrogen into forms which can be taken up as food by plants. This beneficial process is brought about by certain microscopic plants in the soil, known as the ferments of nitrification, the development of which is greatly encouraged by the presence of carbonate of lime. To all soils deficient in lime, as we have said, it may advantageously be applied, furnishing thereby not only plant food, but also setting free in the soil the inactive stores of mineral matter, so that such may be assimilable by vegetation. Lime in all its forms has proved of special value as a manure for the leguminosæ—of which pease, beans, &c., are important members.

A good marl for agricultural purposes should be of a light colour, and not of a hard or flinty nature. It should easily disintegrate or break down on exposure to the weather, allowing a ready mixture with the soil.

New Brunswick.—Two samples, from the upper and lower layers of the deposit, have been received from Dawsonville. The upper and darker layer was a mixture of muck (decayed vegetable matter) and marl; the lower layer of a light-gray colour, proved to be entirely composed of shell marl. This latter sample was submitted to analysis, with the following results:—

Moisture	68·91
Organic and volatile matter	4·66
Carbonate of lime	21·90
Oxide of iron and alumina	·87
Clay, sand, &c	2·56
Magnesia, &c., by difference	1·10
	100·00

This is a very good marl. If piled and allowed to dry out, a saving could be effected in connection with its hauling. Simply drying by exposure would result in a marl containing from 60 to 70 per cent of carbonate of lime.

Specimens of marl from the Macdonald beds, Restigouche, have also been recently examined by us. The samples were forwarded by Mr. John McAllister, M.P., Campbellton, N.B.:—

	No. 1. Surface.	No 2. 15 feet below Surface.
Insoluble rock matter	15·03 p.c.	75·05 p.c.

No. 1 is a marl of very fair quality.

No. 2 is very poor and of very little value agriculturally, owing to the large excess of inert material.

Nova Scotia.—In many districts where the soil is deficient in active lime, and where deposits of marl to supply this deficiency are not available, it frequently becomes of importance to farmers to learn if lime can be obtained by burning the rock of the neighbourhood. In this connection the following letter and analysis will be of interest. Mr. James W. Stairs, of Halifax, writing under date of June 11, 1900, says:—'I send you two samples of limestone from Meagher's Grant, Musquodoboit, Halifax county. Will you please analyse them and let me know if they will furnish lime fit for farming purposes? There is a large mass of it, and if on burning we can obtain good lime, we shall be able to furnish our farms with a much needed constituent. There must be hundreds of thousands of tons in the deposit; it extends over a large tract of country.'

Our analysis and report is subjoined :—

	Large Specimen.	Small Specimen.
Carbonate of lime	53·92	52·08
Carbonate of magnesia	39·23	39·90
Oxide of iron and alumina	....	4·06
Insoluble rock matter	3·24	2·06

For all practical purposes, these samples may be considered identical. They are not true limestone, but that variety known as magnesian or dolomitic limestone. Owing to the presence of the carbonate of magnesia, a 'fat' lime cannot be obtained on burning this rock—it can only furnish 'poor' lime, that is, one that slakes badly. This fact, however, should not deter farmers from burning this limestone when their soil is in need of lime. We have no doubt it will yield, when well burnt, a most useful fertilizer for all such soils.

Island of Anticosti.—A very large deposit of marl, probably 150 acres in extent and of unknown depth, exists at Ellis Bay, Lake Mignon, which is about one-third of a mile in the interior of the island. Having received a request for an examination and report on this material as a fertilizer from M. Comettant, Governor of the island, we submitted a sample to analysis with the following results :—

Analysis of (air-dried) Marl.

	Per cent.
Moisture	2·65
Vegetable and organic matter	13·87
Sand and clay	25·78
Oxide of iron and alumina	2·93
Carbonate of lime	52·52
Phosphoric acid	Traces.
Potash	·42

We reported on this marl in the following terms :—

These data show this material to be marl of fair quality. Judging from its composition, as well as from its mechanical condition, it should prove a valuable amendment for all sour, peaty and heavy clay soils, as well as for all soils deficient in lime.

Phosphoric acid is present only in traces, and the percentage of potash is not larger than that in many soils of good average fertility. From these facts it is clear that this substance cannot be used as a substitute for fertilizers supplying these elements of plant food.

The proportion of semi-decayed vegetable matter (humus) present slightly enhances the value of the marl, more especially if it is to be applied to light soils, poor in organic matter.

GYPSUM OR LAND PLASTER.

Among the naturally-occurring fertilizers of Canada, gypsum or land plaster must be considered as one of the most valuable and important. As, however, it does not contain either nitrogen, potash or phosphoric acid, it is not in any sense comparable to commercial fertilizers, the value of which lies in the percentages of these constituents they contain. Gypsum is sulphate of lime* and, therefore, as a direct supplier of plant food can only furnish sulphur and lime; but as an indirect ferti-

*Pure gypsum is composed of lime 32·5 per cent, sulphuric acid 46·5 per cent, and water 21·0 per cent ($CaSO_4$, $2H_2O$.)

lizer it has an additional value in liberating in an available form potash from its locked-up stores (the double silicates) in the soil. It may, therefore, in a sense be considered a potassic fertilizer. For this reason especially, it has been found of benefit for leguminous crops, such as clover, beans and pease, plants which respond readily to treatment with potash. As a manure for turnips, Indian corn and many leafy crops, it has also been used profitably, as well as for top-dressing grass lands, in which it encourages the growth of the clovers. Very poor soils give but little return, as a rule, from a dressing of gypsum—on such it must be supplemented by a more complete manure—but on rich soils and with the afore-mentioned crops it is wont to give an immediate return.

From an agricultural stand-point, however, one of the most valuable properties of this material is that of 'fixing' or retaining ammonia. Rather than apply it directly to the soil, we, therefore, advise its use as an absorbent in the stable and cow-house, where, sprinkled on the floor, it will prevent the loss of ammonia from the fermenting urine. Thus, the atmosphere of these buildings is rendered more wholesome for the farm animals, and the manure made more valuable. A sample of gypsum sent by Mr. J. R. Mosher, Kempt Shore, N.S., and recently analysed by us, afforded the following data :—

	Per cent.
Insoluble rock matter	2·99
Calcium sulphate (gypsum)	91·80
Undetermined mineral constituents	5·21
	100·00

It is evidently a very good sample.

Former analyses of samples from Nova Scotia made in the Farm Laboratories may be tabulated as follows:—

	A.	B.
Insoluble rock matter	15·85	·48
Calcium sulphate (gypsum)	68·65	97·53
Oxide of iron and alumina	3·91	Traces.
Calcium carbonate	4·98	....
Magnesium carbonate, &c. (undetermined)	6·61	1·99
	100·00	100·00

Gypsum occurs in Canada, essentially, in large irregular masses, from a few yards to one-quarter of a mile in extent, and from 5 to 8 feet in thickness.

In Ontario, it is more especially found in large lenticular masses, interstratified with dolomitic rocks, in the vicinity of Paris and along the Grand River, between Paris and Cayuga. It is also quarried in large quantities in New Brunswick and Nova Scotia, occurring in vast deposits near Hillsboro,' Petitcodiac, along the Tobique River, N.B., and at Wentworth and Montague, in Hants county, and other places in Nova Scotia.

WOOD ASHES.

Attention has frequently been directed to this home-produced fertilizer, more particularly as a source of potash, and analyses of samples collected in various parts have from time to time appeared in our reports. The composition of wood ashes must

necessarily be somewhat variable, but there are limits within which all genuine unleached ashes should be found. Exposure and leaching will lower the percentage of potash and increase the proportion of water, while careless collection or the intentional addition of sand or other inert matter will further lessen their value. For these reasons it would, therefore, be advisable to purchase only on guaranteed analysis.

Since wood ashes sell for less than $10 per ton, their examination is not made with that of other fertilizers by the Inland Revenue Department, under the Fertilizer Act. This fact furnishes an additional reason for the necessity of farmers and orchardists, when purchasing car lots, insisting on a certified statement as to the fertilizing value of the ashes, or else taking a representative sample and having it submitted to analysis by a chemist of repute.

We are not of the opinion that there is much intentional adulteration in Canada, but it is certainly true that occasionally very poor samples have been received by us from correspondents. A notable case, illustrating this fact, is the following:—In May of the current year, a correspondent in Waterville, N.S., asked us to examine a sample of ashes from a carload which he and other farmers were buying together. Though such an examination does not come within the regular scope of our work, the circumstances as stated seemed, on investigation, to warrant us in making an exception, and the analysis was made. The data are as follows:—

	Per cent.
Moisture	26·93
Insoluble mineral matter	5·82
Potash	2·59
Phosphoric acid	·74

These figures should be compared with the subjoined, which are the averages obtained by the Massachusetts Experiment Station from the analysis of 476 samples of Canadian hardwood ashes, sold in that state :

	Per cent.
Moisture	10·64
Insoluble mineral matter	14·22
Potash	5·37
Phosphoric acid	1·52

In our laboratories we have found a variation in apparently genuine samples from 5 to 12 per cent potash, and we are of the opinion that good, unleached ashes do not, as a rule, fall below 5·5 per cent potash. It is obvious, therefore, in the case under consideration that a loss of approximately 50 per cent of potash had taken place by exposure or by intentional leaching. In other words, valuing the potash at 6c. per pound, a ton of ashes analysing 5½ per cent potash would be worth for potash alone $6.60, while the Waterville sample would only be worth $3.11 per ton. It is evident from this consideration that the question of composition is worthy of attention on the part of those who purchase this fertilizer.

WOOL WASTE.

As pointed out in our report for 1890, this material has frequently a notable value as a fertilizer from the amounts of nitrogen and potash it contains. Thus, in a sample then analysed, we found 1·31 per cent nitrogen, and 3·56 per cent potash. That this waste product, however, is quite variable will be obvious on comparing these data with those about to be given, and which have recently been obtained on the analysis of a sample from the Oxford Mills, N.S.

Analysis of Wool Waste, Oxford Mills, N.S.

	Per cent.
Moisture	6·90
Ash or mineral matter	10·86
Mineral matter insoluble in acid	8·50
Phosphoric acid	0·09
Potash	0·26
Nitrogen	4·38

The amounts of phosphoric acid and potash are so small that they may be disregarded, the only fertilizing element of value present being nitrogen. This exists to the extent of 87 pounds per ton. Since the nitrogen in wool waste is not a condition assimilable by plants, it becomes necessary, or at any rate advisable, to submit the material to fermentation, as in the compost heap, before application to the soil. To this end it may be mixed with wood ashes or lime, or composted with actively fermenting manure. The sample under comment was found to contain 31·15 per cent of oil or fat. This would prevent the ready decomposition of the waste and certainly reduce very much its fertilizing value. The amount of oil is so large that one is prompted to predict its economic recovery would be quite practicable.

FODDERS AND FEEDING STUFFS.

Our investigation relating to the composition of Canadian forage crops and feeding stuffs has included during the past year certain leguminous plants and grasses grown in the experimental plots under the direction of Dr. Fletcher, several varieties of mangels, carrots, turnips and sugar beets from the crops of 1900, rape at various periods of growth furnished by the Agricultural Division, besides many feeding stuffs of which samples have been received for analysis.

The value of a cattle food, from the feeding standpoint, depends upon its composition and digestibility. It becomes, therefore, important to have some knowledge of the character of a fodder's constituents and of the functions of those constituents in the animal system. We consequently in the following paragraphs, explain in brief these matters, and thus afford information that will be of assistance in understanding the data detailed in tables of analyses.

Water.—The percentage of water present depends upon the nature of the fodder. In roots there is about 90 per cent; in green fodders, e.g., corn and grass, there is usually between 70 per cent and 80 per cent, according to variety, time of year, &c.; in hay we find about 14 per cent, and in cornmeal, oil-cake, and milling products generally, between 7 per cent and 12 per cent.

Although water is as necessary to the animal as it is to the plant, yet on account of its abundance in nature no value can be assigned to it in fodders. It must not be forgotten, however, that succulency, a most important quality, influencing greatly both the palatability and digestibility of a food, is due chiefly to the presence of the natural or original water. It is succulency that gives to many green fodders a value, as for milk production, above that apparently indicated by their composition.

During the maturing of many foliaceous plants, such as grass, Indian corn, &c., the withdrawal of water, accompanied by other changes, tends to lower somewhat the digestibility and hence the value of some of the constituents. Hence some plants may be more nutritious in their green and succulent state than they are when ripe and dry, in spite of the fact that in the latter condition the solid food materials may largely exceed that found in the green and immature fodder.

Fat.—Of the non-nitrogenous constituents, fat has the highest nutritive value; and this chiefly because it contains a larger percentage of carbon than fibre, or the carbohydrates, in the burning of which in the blood much heat is evolved. By its combustion, fat generates the greater part of the heat of the body. Its high value is largely due, also, to the fact that it can be transformed into fatty tissue of the animal much more readily than the other organic ingredients. It aids the digestion and assimilation of the albuminoids and preserves them from undue waste.

Fibre—Is the least valuable of the food ingredients. It is the part of plants that in part corresponds in function to that of the bones of animals, viz., the supporting and strengthening of the other tissues. By chemical means it can be separated from the other parts of a fodder as a fibrous or woody material. As plants mature, the fibre, as a rule, becomes less digestible, chiefly owing to the deposition of ligneous or woody matter. In composition and function, fibre is similar to the 'Nitrogen-free extract.'

Nitrogen-free Extract or Carbo-hydrates.—Under these terms are included starch, sugars and many allied substances forming, usually, the larger part of the dry matter of a fodder. Their function in the animal economy is to produce heat and energy, though under certain circumstances they may become a source of fat.

Protein or Albuminoids.—These substances constitute the nitrogenous portion of the fodder. They are certainly the most important and most valuable of all the nutritive ingredients, for in the animal economy they alone can play the part of flesh producers, entering into the composition of muscle and cartilage and bone and furnishing essential constituents for the vital fluids—blood and milk. They may also serve in the production of fat, and in the development of heat and energy.

Ash or Mineral Matter—Is that part left when a fodder in the course of analysis is burned, an operation that destroys and dissipates the organic matter. It is composed chiefly of lime, magnesia, potash and soda, combined with phosphoric, hydrochloric and silicic acids. The functions of these materials in the animal are to assist in the formation of bone (largely composed of phosphate of lime) and to furnish that small quantity of mineral matter found in all animal tissues. It also replaces those saline substances daily excreted.

THE CHEMISTRY OF RAPE.

During the past few years the growing of rape—a plant which, as far as Canada is concerned, may be considered a newly introduced fodder—has been receiving increased attention from our farmers. In certain districts it is now largely used as a forage crop for sheep, swine and steers, and undoubtedly still larger areas in the future will be sown for this purpose. It seemed desirable, therefore, that we should determine by analysis the food value of this plant, so that its true position as regards other coarse or forage crops could be arrived at, and, further, that we should ascertain what changes in its composition affecting its nutritive value take place as it advances towards maturity.

To this end, samples were collected from the rape crops on the Central Farm during the past season at several stages of the plant's growth and submitted to analysis. The variety grown was Dwarf Essex, and the seed was sown at the rate of 4 pounds per acre in drills 30 inches apart. The data are given in tabular form to facilitate comparison of the composition of the plant at different stages. In addition to analyses of the whole plant, an examination was made of the stalks and foliage, separately, of the somewhat mature rape plant.

ANALYSIS OF RAPE—C. E. FARM, 1900.

Number.	Date of Sowing.	Date of Collection.	Days of Growth.	Height of Plant.	Fresh Material.								Water-free Substance.						
					Water.	Fat.	Fibre.	Nitrogen free Extract.	Crude Protein.	Alb'd Nitrogen.	Non-Alb'd Nitrogen.	Ash.	Fat.	Fibre.	Nitrogen free Extract.	Crude Protein.	Alb'd Nitrogen.	Non-Alb'd Nitrogen.	Ash.
1	June 23..	July 24..	31 days...	12 in....	93·20	0·12	0·83	2·01	2·20	0·20	0·15	1·64	1·77	12·20	29·64	32·32	2·98	2·19	24·07
2	" 16..	" 24..	38 " ...	20 in....	93·80	0·11	1·02	2·00	1·75	0·16	0·12	1·32	1·75	16·51	32·29	28·19	2·57	1·93	21·26
3	May 19..	" 24..	66 " ...	31 in....	93·16	0·07	1·34	2·59	1·45	0·14	0·09	1·39	1·07	19·57	37·93	21·27	2·11	1·28	20·16
4	" 19..	Aug. 10..	83 " ...	34 in...	92·34	0·06	1·56	4·02	0·98	0·09	0·07	1·04	0·88	20·42	52·33	12·79	1·12	0·92	13·58
5	" 19..	" 24..	97 " ...	44 in....	89·86	0·09	2·48	4·69	1·35	0·13	0·09	1·53	0·89	24·44	46·28	13·33	1·30	0·84	15·06
6	" 19..	" 24..	97 " ...	44 in....	85 10	0·02	5·83	6·29	1·21	0·19	0·003	1·55	0·15	39·14	42·20	8·11	1·27	0·022	10·40
7	" 19..	" 24..	97 " ...	44 in....	90·75	0·14	1·77	4·32	1·51	0·14	0·098	1·51	1·52	19·14	46·72	16·28	1·51	1·06	16·34

NOTE.—Samples 1 to 5 inclusive consist of the whole plant minus the root, that is, of the stem and leaves. No. 6 consists of the stalk, and No. 7 of the leaves, taken from plants similar to those analysed as No. 5.

It is very evident from the large percentage of water present throughout the whole life of the plant that rape is to be classed as a succulent forage crop. For this reason (its high water content) it cannot be preserved in the silo, nor, on account of the crumbling to powder of its leaves on drying, can it be cured on the field. It is, therefore, consumed, either on the field or by soiling, by the animals as it grows, and thus all expense in harvesting saved.

Dry Matter.—Though the variation in the composition of the plant throughout its period of growth is not great, there is a well marked tendency in certain directions that we may call attention to. In the first place, it is to be noted that while there is not much change as regards water content during the earlier two months of growth, there is from that period on a gradual increase in the percentage of dry matter. Thus, in rape one month old we found 6·80 per cent dry matter, while in that three months old (when the whole plant was still edible), there was 10·14 per cent dry matter. It is apparent, therefore, that, judged from this consideration solely, the older plants, weight for weight, would have the greater fodder value. This increase in the amount of dry matter seems to be due principally to the larger proportion of stalk to foliage in the more mature rape. Thus, in Nos. 6 and 7 we have the composition in detail of the stalks and foliage respectively of plants of the same age as those recorded under No. 5. These show that the stalks contain approximately 5·5 per cent more dry matter than the foliage. After the plants have reached a certain and more advanced stage of growth this apparent benefit is, however, to some extent offset by the greater development of fibre in the stalks, making them hard and unpalatable, and to some degree no doubt less digestible. The foliage always contains much less fibre than the stalks.

The changes that take place in the composition of the dry matter during the period of growth are best understood from a study of the data recorded for the water-free substance.

Fat.—Usually a number of substances, of which chlorophyll is the chief, are included with the fat when employing the ordinary process employed for fat estimation. In the case of seeds, meals, and feeds of a similar character, no great error is introduced by such a determination (since from these materials the solvent takes nothing but fat), but in the case of green fodders the difference between the crude fat (including resins, gums and chlorophyll) and the true or pure fat or oil is frequently very large. Hence, we decided in these analyses to employ a discriminating method, and the figures given, therefore, represent true fat.

It would seem that the younger plants are the richer in fat, and this evidently in a large measure is due to the fact that the proportion of foliage to stalks is greater in them than in the more mature plant. This would probably not hold true to so great an extent in rape grown broadcast. The stalks (No. 6) are seen to contain but one-tenth the amount of the fat in the foliage (No. 7).

Fibre.—As might be expected, the percentage of this constituent increases with the age of the plant. The stalks are naturally more fibrous than the leaves (compare Nos. 6 and 7), and since they (the stalks) are more prominent as the season advances the analysis of the whole shows an increasing fibre content. In speaking of the relative development of stalk to leaf, it may be of interest to state that in the rape collected August 24, the proportion of stalk (taken from the ground to the base of the lowest leaf) to leaf was 1 to 4, by weight. In rape sown broadcast, the proportion of stalk would probably be much less.

Crude Protein.—This term is applied in a comprehensive sense and is used to include all the nitrogenous substances of the plant. In the case of seeds—including grains of all kinds and their milling products—this involves but little error, since practically all their nitrogen exists in the true albuminoid form. For such substances the amount of 'crude protein' is a true indicator of their food value for furnishing

the nitrogenous portion of the ration, for it really stands for albuminoids, which, as already stated, are the most important of all food constituents in maintaining life and building up of the animal tissues. With green and immature fodders, however, the term 'crude protein' comprises not only the albuminoids, but also other nitrogenous substances (nitrates, amides, &c.), which, it may be remarked, have a very much lower feeding value—indeed, it is not probable that these compounds are a source of nitrogen to the animal system. In order to ascertain the proportion of these two forms of nitrogenous compounds and thus arrive at a more correct knowledge of the feeding value of rape at different periods of its growth, we determined the nitrogen present in the non-albuminoid compounds, as well as in the true albuminoids. A survey of the data will reveal that as the plant grows the proportion of the latter to the former increases, and, therefore, the nitrogenous matter of the older plants is more valuable from the food standpoint; in other words, the non-albuminoid nitrogenous substances tend to decrease with the growth of the plant. This statement, however, must be considered in connection with another fact, made equally clear by our data, namely, that as the season advances the rape shows a falling off of both the albuminoid and non-albuminoid nitrogen. Weight for weight, the younger plant is richer in both classes of these compounds than the older rape. This is due to the fact that the assimilation of nitrogen from the soil by the plant goes on more rapidly during the first month or six weeks of growth than later. The larger yield per acre obtained from a crop three months old compared with that of two months, very largely offsets this decline in the percentage of albuminoids, and no doubt makes it desirable from an economic standpoint in many instances to allow the crop to come to the more mature period, provided always that the plant is not becoming unpalatable from the development of hard and fibrous stalks.

Nitrogen-free Extract or Carbohydrates.—The percentage of nitrogen-free extract increases greatly in the fresh fodder, as well as in the dry matter, during the latter weeks of growth.

Ash or Mineral Matter.—A comparison of the percentages of this constituent in the dry matter makes it evident that it is more particularly during the earlier weeks of growth that the rape plant makes its greatest draught upon the available stores of mineral plant food in the soil.

To sum up the foregoing observations, we may conclude: (1) that the rape plant of four to six weeks old contains more water and less dry matter than that of three months; (2) that the *dry matter* of the younger plant is relatively richer in fat and albuminoids (protein) than that of the older rape; (3) that the non-albuminoid nitrogenous compounds decline as the season advances; (4) that the percentage of fibre increases with the age of the plant, due to the greater development of stalk; (5) that the nitrogen-free extract increases with the growth of the plant; (6) that the percentage of ash in the dry matter decreases as growth progresses. It would appear, therefore, that on the whole the *dry matter* of the six weeks old rape has a higher feeding value than that of rape of three months' growth, but that, owing to the increased percentage of dry matter in the mature plant and the much larger yield of crop obtained from the latter, the feeding value per acre at the more advanced period of growth is the greater. And this will probably be more emphasized in rape sown broadcast than in drills, as the proportion of stalk to foliage in the former will be less.

The fact that the assimilation of the soil plant food elements takes place chiefly during the first six weeks of growth points to the benefit to be derived from a thorough preparation of the soil.

Compared with other forage crops, rape, although it possesses a large percentage of water, takes a high place, owing to its, comparatively speaking, large percentage of nitrogenous constituents (albuminoids). In this respect it closely resembles clover and other legumes, which, for the same reason, are justly considered to have a feeding value above most of the grasses and root crops in general.

LEGUMES.

The leguminosæ, to which clover, pease, beans, vetches, &c., belong, are characterized by a high nitrogen content (protein), and consequently furnish fodder of greater feeding value than grasses, roots and many other forage plants. Several members of this family have from time to time been analysed in the Farm laboratories, and their composition published. (The reader is referred especially to the report of the Chemical Division for 1893). During the past summer further samples have been collected from the 'grass plots' of the farm and submitted to analysis. The data obtained are given in the following table :—

Analysis of Legumes—1900.

Samples were collected on July 4, 1900, when all the plants were in full flower.	Fresh Material.						Water-free Substance.				
	Water.	Fat.	Fibre.	Nitrogen—free Extract.	Crude Protein.	Ash.	Fat.	Fibre.	Nitrogen—free Extract.	Crude Protein.	Ash.
Wild Pea from North Bay... (Lathyrus maritimus.)	81·01	·24	5·35	7·63	4·22	1·55	1·28	28·19	40·14	22·22	8·17
Grass Pea.................. (Lathyrus sativus.)	87·06	·11	3·66	4·74	3·03	1.40	·84	28·29	36·60	23·44	10·83
Wagner's Wood Pea......... (Lathyrus sylvestris Var Wagneri.)	83·66	·05	5·60	5·05	4·49	1·15	·31	34·25	30·94	27·45	7·0
Purple Tufted Vetch........ (Vicia Cracca.)	74·91	·12	7·20	10·20	5·49	2·08	·49	28·69	40·67	21·87	8·28

For the botanical information in the following paragraphs I am indebted to Dr. James Fletcher, Botanist of the Experimental Farms.

Wild Pea or Seaside Pea (*Lathyrus maritimus*), from North Bay.—A deep-rooted, free-growing and very persistent perennial, stout and succulent, somewhat fleshy leaves with 6 to 12 leaflets ; flowers, 6 to 10 inches long ; racemes, long, purple. Judging from the analysis, this plant should afford a rich fodder, and since it gives a large yield it is certainly worthy of trial. It is stated that cattle eat it with relish.

Grass Pea, Chickling Vetch (*Lathyrus sativus*).—An annual with a weak, winged stem, with solitary flowers and compound leaves of four long and narrow leaflets. A good fodder, either green or cured, especially for sheep, now extensively grown in western Ontario on account of the seed being exempt from the attack of the pea weevil. From the great length of its growing and flowering period, it should form an excellent soiling crop.

Wagner's Wood-pea (*Lathyrus sylvestris Wagneri*).—A fodder plant introduced a few years ago, receiving extensive advertising and stated to do well even on poor soils. It is a free-growing leafy pea. In its second year of growth at the Experimental Farm, Ottawa, it produced a thick mass of leafy stems, nearly 4 feet in height. Analysis shows it to be extremely rich in nitrogenous matter (protein). Though cattle do not first evince a liking for it, it is said by English writers that they soon eat it with relish, both in the green condition and as hay. On account of its high feeding value and the large yield per acre to be obtained, it may become an important addition to our present list of forage and soiling crops.

Purple-tufted Vetch (*Vicia Cracca*, L.).—A deep-rooted and very persistent perennial ; leaves with about 20 leaflets ; flowers, violet and blue, in clusters of about 30, but producing few good seeds; stems, slender, requiring some other plant, such as rye, to support them. It is much relished by stock, and undoubtedly is an excellent fodder. Of the four examined, this plant showed the highest amount of dry matter.

ROOTS.

In connection with a series of feeding trials with steers conducted by the Agricultural Division, it became of importance to learn the respective food values of certain roots. We accordingly submitted to analysis, from the crop of the present year, three varieties of mangels, two of carrots, three of turnips, and one of sugar-beets—the latter from the crop under (a) special culture, and (b) ordinary field culture. The information thus obtained will, it is hoped, prove of interest to all farmers and stock-raisers, for, as will be noticed, large differences in feeding value sometimes exist even between two varieties of the same class of roots.

Though in many parts of Canada the corn crop has to a very large extent displaced roots, there appear to be areas of considerable magnitude (as in the Maritime provinces) better adapted by reason of local climatic conditions to the growth of roots. But whether corn can or cannot be grown advantageously, should not alone decide the question as to the culture of roots. It is true that more feed per acre can be obtained from glazed corn than from roots—and that it furnishes feed which in a measure may replace the grain of the ration while at the same time acting as a succulent fodder. It is also true that roots contain a large percentage of water and that the 'dry-matter' is not rich in protein. Nevertheless, roots by reason of their ready and practically complete digestion, their succulent nature, and what may be termed their medicinal properties—due to their richness in saline matter—have been found by stock-feeders of long experience to be an exceedingly valuable constituent of the ration. It is probable that they aid materially in the digestion of the rest of the food, and no doubt also prove useful in the proper extension of the digestive apparatus. Roots are essentially non-nitrogenous, their dry matter having a wide nutritive ration (1: 8 to 1: 13), and consequently cannot be used economically, save as part of the ration.

ANALYSIS of Roots, Central Experimental Farm, Ottawa, 1900.

	Fresh Material.							Water-free Substance.				
———	Water.	Fat.	Fibre.	Nitrogen-free extract.	Crude Protein.	Ash.	Sugar in Juice.	Fat.	Fibre.	Nitrogen-free extract.	Crude Protein.	Ash.
Gate Post Mangel	88·86	·03	·85	8 64	·82	·80	6·15	·31	7·64	77·47	7·36	7·22
Giant Yellow Globe Mangel	91·81	·02	·69	5·24	1·24	1·00	2·64	·23	8·49	63·89	15·13	12·26
Golden Tankard Mangel	89·75	·03	·77	7·83	·82	·80	4·78	·32	7·53	76·32	8·00	7·83
Imp'd Short White Carrot	91·54	·07	·87	5·93	·83	·76	2·99	·81	10·41	69·90	9·86	9·02
Guerande or Ox-Heart Carrot	88·36	·14	·90	8·37	1·19	1·04	4·72	1·26	7·77	71·79	10·24	8·94
Skirvings Turnip	89·65	·01	1·17	7·48	1·03	·66	1·54	12	11·30	72·27	9·93	6·38
Champion Purple Top Turnip	89·23	·01	1·31	7 79	·85	·81	1·46	·12	12·19	72·32	7·88	7·49
Rennie's Prize " "	89·64	·004	1·17	7 45	1·07	·66	1·63	·04	11·33	71·94	10·30	6·39
Sugar Beet 'Ordinary Culture'	79·65	·04	1·18	16·85	1·32	·96	16·43	·21	5·80	82·81	6·47	4·71
Sugar Beet 'Special Culture'	78·51	·04	1·16	18·08	1·39	·82	16·98	·20	5·39	84·10	6·47	3·84

Since the 'dry matter' of roots may for practical purposes be considered as entirely digestible, the relative feeding value of the different varieties will be in proportion to the percentage of dry matter they contain and the richness of that dry matter in protein. The amount of fat present is so small that it does not call for special consideration. In addition to the usual fodder analysis, a determination of sugar in the juice of the root was made.

Mangels.

The percentages of dry matter in the three varieties examined are :—

	Per cent.
Gate-Post, red	11·14
Giant Yellow Globe	8·19
Golden Fleshed Tankard	10·25

Weight for weight, therefore, the 'Gate-Post' is much the more valuable mangel, containing approximately one-fourth more dry matter than the 'Giant Yellow Globe', which in this respect, it will be remarked, is the poorest of the three varieties examined. The 'Gate-Post' mangel is, further, characterized by a high sugar content, a feature of considerable importance from the feeding standpoint.

The 'Giant Yellow Globe' mangel presents several peculiarities of composition. In the first place, the percentage of dry matter is small, while that of the nitrogenous organic matter is exceptionally large for this class of root. Our experiments go to show that approximately 50 per cent of the nitrogenous matter exists as true protein. The 'Golden Fleshed Tankard' occupies a place very close to that of the Gate-Post.'

Carrots.

The dry matter of the varieties examined may be stated as follows :—

	Per cent.
Improved Short White	8 46
Guerande or Ox-Heart	11·64

From these data we may conclude the last named variety to have the greater feeding value. Not only is it the more valuable from a larger percentage of dry matter, but also from the better quality of that dry matter. This fact is revealed by the data expressing the percentages of sugar in juice, of protein and of fat, all of which are higher in the case of the Ox-Heart carrot.

Turnips.

The three varieties of turnips analysed yielded the following percentages of dry matter :—

	Per cent.
Skirvings	10·35
Champion Purple Top	10·77
Rennie's Prize Purple Top	10·36

Not only from the above data, but also from those of the detailed analysis, it will be observed that such differences in composition as exist are very slight.

Sugar Beets.

In order to learn what improvement in feeding value might result by giving sugar beets that special culture necessary for roots intended for the sugar factory, samples of Vilmorin's Improved, grown respectively under ordinary and special culture at the Experimental Farm, Ottawa, have been analysed. With the exception of, practically, 1 per cent more dry matter in the beets of special culture, the results are exceedingly close. The figures denoting the composition of the water-free substance are for the most of the determinations almost identical. It is, therefore, improbable that there would be any adequate return for the expense involved in giving the beets 'special' culture when they are intended for feeding purposes, and more especially would this be the case if, as is usual, there were a larger yield per acre when grown under ordinary field conditions. The samples analysed contained about 21 per cent of dry matter, three-fourths of which is sugar. Sugar beets are very valuable feed. It is stated, however, that if fed largely, sugar beets cause scouring.

In considering the value of different root crops, not only the composition, but the yield and cost of production per acre should also be taken into account.

COTTON-SEED MEAL.

Numerous inquiries have been received during the past year regarding the composition and use of this concentrated feed stuff, which, as far as many districts are concerned, may be considered as a newly introduced feeding material.

The following determinations have been made on samples recently forwarded for examination:—

	No. 1	No. 2.
Crude protein (albuminoids)......	43·87	43·37
Crude fat or oil......	11·63	13·11

No. 1 was sent by Mr. F. W. Davidson, Anagance, N.B. No. 2 was received from Mr. G. E. Stopford, Tidnish, N.S., and bore the label of the American Cotton Oil Co., St. Louis, Mo., guaranteeing protein 43·00 per cent, and fat or oil 9·00 per cent. It is believed that No. 1 is from the same source. Both samples are fully equal to the guarantee; indeed, as regards oil, a valuable fodder constituent, they are considerably richer than called for by the vendor's statement.

Information respecting the general use and feeding value of cotton-seed meal is given on page 149 of our report for 1899, where there also will be found a comparative account of the chief concentrated feeds in common use.

BRAN.

Two samples of bran were received from Mr. J. H. Pillar, Russell, Ont., with a request for information as to which of them had the greater feeding value. A partial analysis afforded the subjoined data:

	No. 1.	No. 2.
Moisture......	11·51	11·31
Protein (albuminoids)....	13·64	13·62
Ash......	6·32	6·00

No. 1 is to a slight degree the brighter in colour of the two, and contains somewhat fewer buckwheat hulls. However, as far as chemical analysis can determine, these brans are practically identical in feeding value ; indeed, the figures would

probably not have been closer if both samples had been taken from the same bin. Mr. Pillar writes that these brans were selling in his neighbourhood for $18 and $16 per ton, respectively. The analysis, as we have seen, does not show any such difference in value.

The quality of a bran may be well adjudged from its appearance and freedom from weed seeds and other foreign material.

COCOA-NUT MEAL.

This feeding stuff is the residue after extraction of the oil from the flesh of the cocoa-nut. It is a pleasant-tasted, soft material, of a clean, bright appearance, and is evidently palatable and appetizing.

A sample forwarded by Messrs. Stairs, Sons & Morrow, Halifax, N.S., and imported by A. Cumming & Son, Port of Spain, Trinidad, furnished the following data:—

Analysis of Cocoa-nut Meal.

Moisture	14·65
Fat	5·92
Fibre	11·19
Protein or albuminoids	21·37
Nitrogen-free extract or carbo-hydrates	41·34
Ash	5·53
	100·00

Cocoa-nut meal as a cattle food is practically unknown in Canada, but has earned a good reputation in Europe and certain of the United States (notably in the vicinity of San Francisco), being used more particularly for dairy cows, sheep and swine. The percentage of protein is high, making it a concentrated feed stuff, and it is also rich in fat. These facts, together with the palatableness of the meal, make this food a desirable constituent in the grain ration, provided always that it can be purchased at a reasonable price compared with the various grains and milling products generally used.

CORN MEAL.

In a communication from Mr. A. Broder, M.P., Morrisburg, Ont., who forwarded this sample, the doubt was expressed as to its genuineness. Our analysis, however, makes very clear that it is of excellent quality, and that nothing had been added to it or taken from it.

	Per cent.
Moisture	9·29
Protein	9·69
Fat	4·42
Carbo-hydrates (starch, &c.)	74·33
Fibre	1·01
Ash	1·26
	100·00

Comparing these figures with the published averages of corn meal, a less percentage of moisture is to be noticed in the present sample, which has the effect of increasing the percentage of the other constituents, and thus enhancing its feeding value.

LOW GRADE FLOUR FEED.

This sample was also submitted by Mr. Broder. It had the appearance of a low grade or perhaps slightly damaged flour ; it was quite dark in colour. Under the microscope no trace of other grain than wheat was detected. The data are as follows :—

	Per cent.
Moisture	9·17
Protein	14·85
Fat	3·36
Fibre	·02
Carbo-hydrates (starch, &c.)	71·02
Ash	1·58
	100·00

Such materials can undoubtedly be used to advantage as part of the grain ration, when they can be purchased at a reasonable price. The present sample, it will be noticed, is much richer in protein, though somewhat poorer in fat, than corn meal. The lower grades of flour often contain the germ of the wheat, and for this reason show a higher protein content, making their feeding value greater than that of ordinary flour.

CHICAGO STOCK FEED.

From time to time cattle tonics, condiments and special foods are largely advertised, and their sale pushed by energetic agents. The claims for such are at times preposterous, and their price far in excess of either the cost of their constituents or their worth to the farmer. Such a 'food' condiment was received for analysis in March last from the *Farmer's Advocate*, London, Ont., who in turn received it from a correspondent in Norfolk, Ont. It bore the name of the Chicago Stock Food. It was shown that it had been sold in parts of Ontario at the rate of 30 cents per pound (see *Farmer's Advocate*, March 15, 1900). The request from the *Farmer's Advocate* reads as follows :—

'LONDON, ONT., March 15, 1900.

'Under another cover we mail you a package containing about a pound of the Chicago Stock Food, which is being sold by agents in some parts of the country at exorbitant prices to farmers. One person who was imposed upon wrote us particulars of the matter and sent us a small sample, but not enough for analysis, so we wrote him a second time, and have received what we are now sending you. We should very much like to have a statement from you as to what the food contains, so that its commercial value compared with other foods may be estimated. In the current issue of the *Farmer's Advocate* we have an editorial referring to the matter, and it would certainly emphasize the point and put others on their guard throughout the country if it was shown by your examination that the food is one of about ordinary value.

'(Signed) The WILLIAM WELD Co., Limited.'

Our analysis of this food or tonic furnished the following data :—

	Per cent.
Moisture	8·38
*Ash	13·26
Protein or albuminoids	15·74
Fat	6·37
Fibre	5·15
Carbo-hydrates	51·10
	100·00

*Containing saline ingredients.

This condiment consists largely of finely ground linseed meal or cake, to which has been added common salt, saltpetre and copperas (sulphate of iron). It has been flavoured by the addition of a small amount of fenugreek.

The prices generally asked for such condition powders are far in excess of their value, whether such materials be considered as medicine or food, or both. The stock feeder or dairyman will find it greatly to his profit to obtain such medicine or treatment as his animals may at any time require rather than to pay exorbitant prices for materials which may or may not benefit his stock, and the nutritive value of which is certainly less than many concentrated feed stuffs on the market.

SUGAR BEETS.

MANITOBA.

In August of the current year we received a communication from the Winnipeg Board of Trade informing us that the Department of Agriculture of Manitoba had undertaken at the board's request a series of experiments in the growth of sugar beets, and asking for an examination of these beets in the farm laboratories. As no analyses had been made by us of sugar beets raised in Manitoba, and as apparently there were no data on record concerning the relative richness of the root as grown in that province, it was decided to undertake the investigation. It was thought desirable at the same time that beets grown on the experimental farms at Brandon, Man., and Indian Head, N.W.T., should be tested, and to this end samples of the six varieties under test at these farms were received, and, together with those forwarded by Mr. Hugh McKellar, Chief Clerk, Department of Agriculture, Winnipeg, Manitoba, submitted to analysis. The particulars of growth of the roots from Winnipeg are furnished by Mr. McKellar in Table I; their analytical data are given in Table II.

TABLE I—SUGAR BEETS, MANITOBA—1900.

Number.	Name.	Address.	Variety of Beets.	Dates. Sowing.	Dates. Thinning.	Dates. Pulling.	Distance between Rows.	Distance between Plants in row.	—
							inches.	inches.	
1	A. Hutchings	Winnipeg	Klein Wanzleben, Impd.	June 14	July 18	Oct. 16	17	6	Very light sandy soil.
2	A. Hutchings	"	New Danish, Impd	" 14	" 18	" 16	17	6	Near river bank.
3	R. de Vries	Louise Bridge	Impd. Vilmorin.	" 14	" 20	" 10	16	6	Heavy black soil on prairie.
4	R. de Vries	"	Klein Wanzleben, Impd.	" 14	" 20	" 10	16	6	
5	Klaas de Vries	"	New Danish, Impd	" 13	" 18	" 10	16	6	Heavy black soil 18 inches deep.
6	Klaas de Vries	"	Klein Wanzleben, Impd.	" 13	" 18	" 10	16	6	Over yellow clay subsoil.
7	Hugh McKay	Fernton	Impd. Vilmorin.	" 13	" 25	" 15	16	6	Black soil with a little sand.
8	Hugh McKay	"	Klein Wanzleben, Impd.	" 13	" 25	" 15	16	6	
9	John de Graaf	Louise Bridge	Impd. Vilmorin.	" 11	" 19	" 9	16	6	Same soil as 5 & 6.
10	John de Graaf	"	Klein Wanzleben, Impd.	" 11	" 19	" 9	16	6	
11	Jacob de Vries	"	Klein Wanzleben, Impd.	" 12	" 19	" 15	16	6	Same soil as 5 & 6.
12	Jacob de Vries	"	Impd. Vilmorin.	" 12	" 19	" 15	16	6	
13	D. de Graaf.	"	Impd. Vilmorin.	" 28	" 21	" 12	16	6	Stiff heavy black soil.
14	D. de Graaf.	"	New Danish, Impd	" 28	" 21	" 12	16	6	
15	W. Herries	"	Impd. Vilmorin.	" 12	" 19	" 10	16	6	Same soil as 5 & 6.
16	W. Herries	"	New Danish, Impd	" 12	" 19	" 10	16	6	
17	John P. Haarsma	"	New Danish, Impd	" 14	" 21	" 15	18	6	Black loam with a little sand.
18	John P. Haarsma	"	Klein Wanzleben, Impd.	" 14	" 21	" 15	18	6	Near river bank.

Beets were thinned when plants were from $1\frac{1}{2}$ to 2 inches high and cultivated at that time, then cultivated once during the season. The beets all grew well down in the ground.

TABLE II—ANALYSES OF SUGAR BEETS FROM MANITOBA—1900.

No.	Variety.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root. Lbs.	Oz.
1A	Wanzleben Improved	10·9	15·4	70·7	—	12
1B	" "	11·8	15·6	75·6	—	13
2A	New Danish "	9·9	14·2	69·7	1	3
2B	" "	10·1	14·2	71·1	1	2
3	Vilmorin's "	9·1	13·3	68·4	1	6
4	Wanzleben "	8·9	13·8	64·4	1	5
5	New Danish "	9·7	14·3	67·8	—	12
6	Wanzleben "	11·9	15·8	75·3	—	10
7	Vilmorin's "	10·3	14·9	69·1	1	2
8	Wanzleben "	7·3	10·4	70·1	1	
9	Vilmorin's "	9·2	13·8	66·7	1	
10	Wanzleben "	9·9	14·4	68·7	1	5
11	" "	11·3	15·4	73·3	1	
12	Vilmorin's "	9·9	14·3	69·2	1	3
13	" "	8·4	12·7	66·1	1	7
14	New Danish "	10·5	14·8	70·9	1	4
15	Vilmorin's "	8·7	13·5	64·5	1	
16	New Danish "	9·8	14·1	69·5	—	15
17A	" "	9·5	14·0	67·8	1	
17B	" "	11·1	15·2	73·0	1	7
18A	Wanzleben "	12·5	16·4	76·2	1	1
18B	" "	11·0	15·6	70·5	1	4

The sugar content is not high and the co-efficient of purity is low ; indeed, the results are far from encouraging. It will be remembered, however, that the weather during the early part of the season, both in Manitoba, and the North-west Territories, was extremely dry ; for this reason, the beets failed to get a proper or early start. Mr. McKellar writes : 'So discouraging was the drought that several farmers who got seed did not sow it, while some that sowed it cultivated the plants down, thinking it useless to leave them.' The exceptional dryness of the soil when the seed was sown and the almost entire lack of rain until the latter part of July undoubtedly militated greatly against the normal growth of the roots and the production of sugar. This drought was followed by very heavy rainfalls in August and September—months that should be warm and dry for a high sugar content.

Since in many instances the percentage of sugar is notably increased during the last two or three weeks of the beet's growth—especially if climatic conditions are favourable—duplicate samples from plots Nos. 1, 2, 17 and 18 were taken by Mr. McKellar on November 1—a fortnight after the date of the first collection. These are designated in the table as 1 B, 2 B, 17 B, 18 B, respectively. In three cases out of the four there had been an increase in the saccharine matter, but in all probability this would have been more marked in a normal season ; for the heavy rains, it is reasonable to suppose, had induced vegetative growth rather than the storing up of sugar.

The results obtained on the beets grown at Brandon and Indian Head are given in Table III.

TABLE III—ANALYSES OF SUGAR BEETS FROM MANITOBA AND N. W. T.—1900.

No.	Variety.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root.		Grown at Experimental Farm.
					Lbs.	Oz.	
1	Danish Red Top.......	7·4	10·6	69·5		12	Brandon, Manitoba.
2	Wanzleben	8·5	12·5	68·1		15	" "
3	Danish Improved	7·2	11·4	63·4		12	" "
4	Red Top Sugar...........	7·8	11·8	65·8		15	" "
5	Vilmorin's Improved.....	9·8	13·2	73·7		11	" "
6	Improved Imperial.	7·4	11·6	63·6		13	" "
1	New Danish Improved....	10·6	14·2	74·6	1	10	Indian Head, N.W.T.
2	Wanzleben.............	9·5	13·4	70·9	1	9	" "
3	Danish Improved.........	7·9	11·6	67·6	1	13	" "
4	Red Top Sugar....... ...	7·7	11·4	67·5	1	15	" "
5	Vilmorin's Improved. ..	11·6	14·8	78·4	1	9	" "
6	Improved Imperial........	6·6	10·8	61·1	2	2	" "

Their treatment at Brandon may be outlined as follows : 'Land in fodder corn in 1899 ; ploughed once and harrowed in spring 1900. Seed sown May 15, roots taken up October 3. Rows 30 inches apart and plants left standing about 9 inches apart in the rows.' Mr. Bedford continues : 'The roots are unusually small, owing to the severe drought of spring and early summer.'

The particulars furnished by Mr. Mackay are : 'Land fallowed 1899, ploughed 5 inches deep and harrowed in spring 1900. Seed sown May 18, roots pulled September 28. Distance between row, 28 inches, distance between root, 7 to 8 inches.'

As regards quality, i.e., sugar content and purity of juice, these beets are no better than those grown at or near Winnipeg. We feel, therefore, obliged to state that the present results have not given any indication of roots sufficiently rich and pure as to be suitable for sugar manufacture.

It is obvious that we are not yet in a position to speak definitely as to the possibility of growing in Manitoba a beet with a high sugar content, owing to the exceptional character of the past season, the fact that all the roots examined did not receive special attention or culture necessary for the best results, and that the samples represent but two localities in the province. Further work another year, when the season is normal, will be necessary to determine that question. It is only right, however, to point out that in many parts of Manitoba the climatic conditions for the purpose of sugar beet growing, which must comprise a sufficient and well distributed rainfall in the early months of growth, a high mean summer temperature and absence of early autumn frost, are not such as to lead us to regard with sanguineness the prospect of obtaining many areas that could furnish an ample supply of rich beets, without which, of course, profitable sugar manufacture would be impossible.

ALBERTA.

At the request of the Department of Agriculture for the North-west Territories, we have examined two samples of sugar beets grown at Magrath and Stirling, Alta., by the Canadian North-west Irrigation Company, of Lethbridge, Alta. Regarding these roots, Mr. C. McGrath, manager of the company, writes : 'The samples forwarded consist of thirteen beets, the four larger ones from Magrath, the others from Stirling —all grown on sod. We were unable to supply either of these settlements with water from our canal system during the past season, owing to the fact that the ditches have only recently been completed. The settlement at Magrath got more rain than Stirling, hence the former place has supplied the larger beets.'

On arrival of the beets at the farm laboratories, it was found that they had dried out considerably, and consequently would show a higher percentage of sugar than present when dug. Of course, it was impossible to ascertain the degree to which concentration of the juice had taken place. Our results are as follows:—

Locality.	Number of roots in Sample.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Coefficient of Purity.	Average Weight of one Root.	
					Lbs.	Oz.
Magrath............................	4	15·19	21·02	72·26	1	9
Stirling	9	17·32	22·12	78·3		11

Though undoubtedly the above percentages are exceedingly good, especially when we remember that the roots were grown on sod, I do not think it would be safe to consider them as necessarily indicating that the Lethbridge district would always yield beets with a high sugar content. The fact, already referred to, of the drying out of the beets and the small number examined make it desirable that further data be obtained before final conclusions are drawn.

PRINCE EDWARD ISLAND.

The question of the possibility of growing in Prince Edward Island beets rich enough to make sugar extraction profitable having recently received considerable attention in that province, we have analysed, at the instance of Mr. A. Callaghan, Charlottetown, a number of roots raised there at various points during the past season.

The information furnished respecting them is very meagre and simply states that 'the seed was sown in the middle of June and the crop was harvested November 10. The drills were 18 inches apart, and the beets about 6 inches apart in the drill.' In all, 18 roots were sent. Table IV. sets forth our analytical and other data:

TABLE IV.—Analyses of Sugar Beets from Prince Edward Island, 1900.

Number.	Number of Roots in Sample.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root.		Locality.
					Lbs.	Oz.	
1	3	12·0	16·5	72·8	1	13	Port Hill.
2	2	15·5	19·2	80·7	1	7	"
3	4	15·2	18·4	82·4		13	Freeland.
4	3	14·9	18·4	81·1	1	2	Conway.
5	3	12·8	17·1	74·5	1	4	"
6	3	13·1	17·5	74·7	1	9	"

The foregoing results show that these beets are for the most part rich in saccharine matter; indeed, they compare very favourably with those grown for sugar manufacture in Europe and the United States. Judging from the sugar content and degree of purity, I am of the opinion the averages obtained indicate that a beet suitable for profitable sugar extraction can be grown in Prince Edward Island. The amount of work done in this investigation is not sufficient, however, to allow us to speak definitely or decisively as to the success of the industry, if it were established.

The roots in sample 'A' had not been properly earthed, and, as a result, their percentage of sugar was lower than in the other samples. From the appearance of

the beets of this sample, about one-third of the root had been developed above ground, a feature which should always be avoided, since it tends to a low sugar content and an excess of certain substances that make difficult the extraction of sugar.

MANITOBA WHEATS.

A COMPARATIVE STUDY OF RED FIFE, PRESTON, STANLEY AND PERCY WHEATS.

As is well known, Red Fife wheat has long been recognized as the standard of excellence for growth in Manitoba and the North-west Territories, yielding a flour rich in gluten and of a high bread-making value. Since, however, this valuable wheat does not always ripen in certain districts before there is danger from frost, Dr. Saunders, Director of the Dominion Experimental Farms, commenced, some years ago, an investigation which had for its object the production of a wheat or wheats of equal value in vigour, productiveness and milling properties with Red Fife, but which would ripen a week to ten days earlier than the latter wheat. The method employed by Dr. Saunders was to cross the Red Fife with earlier ripening varieties (chiefly from Northern Russia), and to grow the cross-breds so obtained, noting their quality, the period required for maturity, &c. Among the wheats so originated are the Preston, Stanley and Percy, the parentage of which is as follows:—

Preston—Ladoga female with Red Fife male.

Stanley—Ladoga female with Red Fife male.

Percy—Ladoga female with White Fife male.

These wheats were originated by Dr. Saunders in 1888, and since that date have been grown in increasing quantities on the experimental farms and elsewhere.

To compare these cross-breds, as regards composition, with Red Fife, analyses have been made from samples of the crop of 1899 grown at the Experimental Farm, Indian Head, N.W.T. The results are tabulated as follows:—

ANALYSES OF WHEATS.

Name.	Locality Grown.	Crop.	Weight per bushel.	Weight of 100 kernels.	Moisture.	Albuminoids.	Fat (ether extract.)	Crude Fibre.	Ash.	Carbohydrates.	Wet Gluten.	Dry Gluten.
			Lbs.	Grams								
Red Fife..	Indian Head, N.W.T	1899	63	3·402	10·68	12·84	2·46	1·85	1·29	70·88	31·39	13·31
Preston..	" "	1899	62¼	3·415	11·56	11·86	2·58	1·93	1·35	70·72	27·83	11·99
Stanley...	" "	1899	63¼	3·4852	11·06	13·16	2·42	2·04	1·41	69·91	33·38	13·47
Percy	" "	1899	63¾	3·6136	10·15	13·67	2·41	2·14	1·66	69·97	34·98	14·72
Average	....		63⅛	3·4789	10·86	12·88	2·47	1·99	1·43	70·37	31·89	13·375

It will not be necessary to discuss in detail the above data, since in previous publications (see especially Bulletin No. 4) we have considered fully the relative values to be assigned to the various constituents when judging of the merits of a wheat. Speaking generally, we may say that the strongest and best wheats, from the baker's standpoint, are those with the highest percentage of gluten (which must be of a firm, elastic quality), and the lowest percentage of moisture.

Judged by accepted chemical standards, all four wheats examined are remarkably good, and compare most favourably with average market samples of the best wheats of the world. This is evidenced by their uniformly excellent percentages of albu-

minoids and of wet and dry gluten, their low percentage of moisture, and their satisfactory weights per bushel and per 100 kernels.*

A feature particularly worthy of note is the remarkable similarity in composition throughout the series. This shows the close relationship of the wheats. Critically examining the data, it will be seen that of the cross-breds, Preston only falls behind the parent in albuminoids ; both Stanley and Percy show higher percentages in this constituent than Red Fife. The best of the series appears to be the Percy, since it gives slightly higher numbers than any of the others in weight per bushel, weight per 100 grains, and percentages of albuminoids and wet and dry gluten. It also contains the least moisture. As far as could be judged, the quality of the gluten was equally good in all.

Attention may be directed more especially to two estimations throughout the series, and which seem to call for special comment : we refer to the moisture and the fat. The former is much lower than that usually found, even in north-western wheats, and demonstrates the high bread-making value of those varieties ; the latter, an important constituent, is considerably above the average. We are at the moment at a loss to account for this almost abnormal percentage of fat (the usual average being about 1·85 per cent), but consider it from the nutritive point of view as an important and valuable feature.

THE NORMAL PERCENTAGE OF MOISTURE IN WESTERN WHEATS.

From several communications received during the earlier months of the current year, it appeared that considerable apprehension was felt by the millers regarding the moisture content of much of the 1899 wheat crop from parts of Manitoba and the North-west Territories. Thus in a letter under date of February 19, 1900, the Northern Elevator Company, of Winnipeg, write : 'There has been much discussion lately about the percentage of moisture contained in Manitoba wheat of the crop of 1899. It would seem that in the wheat from the western districts there is a greater percentage of moisture than in that grown in the eastern portion of Manitoba. The following is a memorandum showing the percentage on carload recently shipped, and which were tested by the Ogilvie Milling Company :—

	Per cent.		Per cent.
Moosejaw	16·31	Emerson.............	13·8
Wolseley	15·07	Virden..............	16·25
Pettapiece.........	15·62	Virden..............	13·2
Gretna, Carberry, Winkler, Altona.....................			12·85

'The general supposition is that the normal percentage of moisture in wheat should be 12·5, and the excessive percentage of moisture in wheat in the western portion of the country has given rise to some speculation as to the keeping qualities of such wheat. As we have large quantities in store in country elevators, we are naturally interested in the matter and should feel very much obliged if you will favour us with your opinion.'

Undoubtedly this assertion, if correct, might mean considerable loss, for an excessive moisture-content in the wheat leads to an inferior quality of the flour. On this point Jago, in his work on the 'Chemistry of Wheat, Flour and Bread,' page 236, says :—

'The question of importance is the influence of water on the quality of the grain or flour, and the interpretation to be placed on such results as are here given. As may readily be supposed, a wheat that is grown either in a naturally damp climate, or

* Analytical data of a large number of Canadian and foreign wheats will be found in the Report of the Chemical Division of the Experimental Farms for 1895.

during an unusually wet season, contains more water than one grown under the opposite conditions. Taken into consideration without reference to the other constituents of the grain, a large proportion of water is to be deprecated, for the very simple reason that water is scarcely worth purchasing at the price given for wheat or flour. This however, is not the only objection to the presence of a large percentage of water ; a much more serious objection is based on the fact that such high proportions show that the wheat is unsound, and that in all probability the other constituents will not be of the most promising character. In the first place, damp wheats and flours favour the development of those organisms which produce mustiness or acidity. In the presence of excess of moisture, too, the gluten of flour is rendered soluble in part, and also loses in elasticity. Further, more or less of the starch will be found to have been degraded into dextrin and maltose by diastasis.'

Considering, therefore, that it was desirable in the interests of both farmers and millers to ascertain the correctness or otherwise of this widespread impression regarding the crop of 1899, we requested Mr. David Horn, Chief Grain Inspector of Winnipeg, to make a collection of Manitoba wheats, taking the samples direct from the car, and forwarding them to us for examination. Accordingly, we received in March 9 samples. Mr. Horn writes : 'They are taken from cars passing here (Winnipeg) and sent in self-sealing jars. The wheats have never been brought into the heat. They are ticketed with the name of the station from which the wheats were shipped.'

The wheats on arrival were immediately ground and submitted to careful analysis. The moisture results are given as follows:—

Moisture in Wheats from Manitoba.

Station from which car was shipped.	1899 Crop. Percentage of moisture.
Grenfell	12·44
Broadview	12 63
Wapella	12·14
Glen Ewan	12·57
Hamiota	12·60
Whitewood	12·25
Indian Head	12·29
Winkler	10·25
Alexander	11·55

These percentages are by no means excessive, though slightly higher than those obtained on the Canadian wheats exhibited at the World's Columbian Exposition, Chicago, 1893, which were as follows:—

Average Percentage of Moisture.

Province	Number of Samples.		Percentage of Moisture.
Ontario	26		11·75
Manitoba	9		11·98
North-west Territories	9		11·55
British Columbia	5		11·48
Total	49	Average.	11·69

The difference between these results and those of 1899 crop may be partly due to season, but we think in all probability it is mainly caused by the drying out of the wheats before examination at Chicago; much of the grain exhibited there had been harvested 12 to 14 months when analysed. But be that as it may, we cannot regard the quantity of moisture in the wheat of the 1899 crop as at all excessive or abnormal, nor such as to cause any alarm in respect to the keeping qualities of the wheat or that of the flour produced from them.

CHEMISTRY OF INSECTICIDES AND FUNGICIDES.

WHALE-OIL SOAP.

The efficiency of a wash or spray made from whale oil soap, as a means of destroying many soft-bodied insects, has long been known; during the past few years, however, this insecticide has received special and increasing attention from fruit growers. It is now advocated and largely used for San José scale, Oyster-shell Bark-louse, plant lice, &c., and information regarding the preparation and application of this remedy will be found in the present report of the Entomologist.

The term whale-oil in this connection appears to be synonymous with fish-oil; indeed, according to some authorities, practically all the brands of 'whale-oil' soap upon the market are made from fish oil. The character of the oil used is said to affect the insecticidal power of the soap; and some suppose it is the whale oil that imparts the peculiar virtue to this wash.

It is considered essential for the efficient action of this soap that it should be made with potash and not soda. Potash makes 'soft' soaps, which are viscous or semi-fluid ; soda gives 'hard' and solid soaps. It is probable that potash soaps make the better and more adhesive wash when a hard water has to be used, but whatever may be the cause for the preferment, entomologists are of one mind in considering that potash soaps only should be used.

At the request of the Entomologist (Dr. Fletcher), we have examined several brands, the samples Nos. 1 to 6, inclusive, being received through the kindness of Mr. Geo. E. Fisher, Freeman, Ont. In the following table the percentages of water and potash are given. From these data the comparative value of the soaps may be deducted; those containing the smaller percentage of water and larger percentage of potash obviously being the better:—

ANALYSES OF SOFT SOAPS.

Number.	Marks.	Date Received, 1900.	Water. — Per cent.	Potash. — Per cent.
1	Owens whale-oil soap	May 18th	45·91	5·31
2	Home made soft soap	" 18th	66·48	6·17
3	Toronto Peerless soft oil soap	" 18th	41·51	8·78
4	Toronto whale-oil soap	" 18th	48·94	6·65
5	Hamilton vegetable oil soap	" 18th	73·82	1·47
6	London soap	" 18th	56·49	5·62
7	J. J. Ward, Consecon	April 17th	21·04	·054

In speaking of the composition of soft soaps, Allen, in his 'Commercial Organic Analysis,' Vol. II., Pt. I., p. 300, says: 'But few complete analyses of soft soaps have been published, but the proportion of water in samples of good quality is usually between 35 and 45 per cent, whilst the anhydrous oxide (potash) varies from 8·8 to 11·2 per cent.' Leaving out of consideration No. 7, which is a soda soap, it will be seen that the majority of the samples examined are below the standard here given.

'Can the whale-oil soap used in spraying for San José scale benefit the tree in any way other than as an insecticide ?' This is a question frequently asked of us. Many orchardists affirm that there is a marked effect upon the vigour of the tree, as shown by the colour of the foliage and the improved appearance of the fruit, that can scarcely be attributed to the insecticidal properties of the soap. We offer the following as an answer to the foregoing question and as a probable explanation of the statement just cited:—

Whale-oil soap of good quality will contain from 9 to 12 per cent of potash. This element, as is well known, is an important and valuable constituent of plant food,

and especially so for fruit trees. It invigorates their growth and tends to the production of fruit with high flavour and good appearance.

It is not at all probable that there is any absorption of the potash from the soap spray through the bark or leaves, as many suppose ; the potash, in common with other mineral foods, must be absorbed from the soil through the roots. If the potash in the soap is to act as a food for the tree, it must follow the same course. It is not difficult to understand how this may readily take place, for sooner or later—probably within two or three weeks of spraying—the rains have washed off the soap, and it has been received and absorbed by the soil in the immediate neighbourhood of the roots. There it is gradually converted into assimilable compounds which can feed the tree.

We may now ask if there is sufficient potash in the amount of soap solution sprayed on the tree to make its value as a fertilizer worth considering. In making the solution for the San José scale, 2 pounds of soap are used per gallon, and probably 2 gallons will be required for a well-grown, mature tree. A simple calculation, on the basis of 10 per cent of potash in the soap and 35 trees to the acre, will show that the soil of each acre of orchard so sprayed receives 14 pounds of actual potash, that may subsequently be set free as plant food. This, though not a heavy application, would, in my opinion, be quite sufficient on many soils to produce a marked improvement. The usual dressing of the fertilizer muriate of potash is 100 pounds per acre, equivalent to an application of 50 pounds of actual potash. Each spraying with whale-oil soap, therefore, it is seen, furnishes an amount of potash somewhat greater than one-fourth of that supplied when using the above-named fertilizer in ordinary dressings.

ARBORINE.

Glen's Arborine is the name given to a much-advertised material for which is claimed very remarkable qualities as an insecticide, as well as the power of protection of fruit trees against mice and other vermin. During the past season numerous requests have been received for information regarding its nature and composition. Thus, in August last the editor of the *Canadian Horticulturist* writes: 'Members of the Ontario Fruit-growers' Association are continually making inquiries as to the nature of Arborine. If you could examine this insecticide, the information would prove of interest to many orchardists.' We, accordingly, procured an unopened 1-pound canister, which bears the following statement :—'A guaranteed protection to fruit and ornamental trees from rabbits, sheep, mice, borers, San José scale and insects. *Directions:* Mix the contents of this can in 1 quart of sweet milk, stir until all is dissolved. Apply with a clean paint brush immediately after mixing, or before milk sours. Price, $2.'

Arborine is a fine powder having the appearance of a yellowish ochre, possessing a peculiar odour not unlike onions, and which, on identification, proved to be that of asafœtida. Under the microscope, many small yellow particles were observed, which, on testing, gave all the reactions for sulphur. A qualitative analysis showed it to consist essentially of ochre, sulphur and asafœtida. The results of a quantitative examination afforded the following data :—

	Per cent.
Moisture	·86
Sulphur	38·73
Oxide of iron and alumina	23·87
Mineral matter, insoluble in acid	22·44
Sulphate of lime	·88

The sum total of these percentages, taken from 100, leaves in the neighbourhood of 13 per cent to be accounted for. This we believe to be chiefly asafœtida, for extraction of the Arborine with carbon bisulphide not only takes out the sulphur above recorded, but also about 6 per cent of a resinous substance having all the char-

acteristics of asafœtida. Experiments show that from 10 to 25 per cent of asafœtida, according to the quality of the substance, is soluble in carbon bisulphide. I think we are, therefore, justified in supposing that the difference already referred to is largely due to the presence of this gum-resin, and that Arborine is essentially a mixture of ochre, sulphur and asafœtida.

Regarding its efficiency, we have no data to bring forward. Most probably, it acts as an excellent deterrent against the attacks of certain forms of life, protecting the tree by virtue of its sulphur, and possibly to a still greater extent by reason of the peculiarly unpleasant and penetrating odour that it emanates, due to its asafœtida. We can only remark that the price asked for this material seems to be greatly in advance of the cost of its components.

WEED KILLING COMPOUNDS.

HARVESTA CHEMICAL COMPOUND—A WEED DESTROYER.

This is a brownish coloured fluid, made in New Orleans, La., and sold for the purpose of destroying weeds in gravel paths. It was analysed at Dr. Fletcher's request.

The mixture was neither caustic nor alkaline, and on analysis was found to contain arsenite of soda and common salt. These together amounted to 4·0 per cent, or 6·4 ounces per gallon ; the common salt being 1·69 per cent, or 2·7 ounces per gallon.

No doubt this is an effective weed exterminator, since both its constituents have long been known and used for this purpose. It is, perhaps, scarcely necessary to point out that such preparations should only be used on paths or where it is desired to kill all vegetation.

WEED KILLING COMPOUNDS.

For those who desire to prepare for themselves a weed-killing fluid we furnish the following recipes. The fluids are cheap and easily prepared, and have been used with good effect :—

1.—To boiling water add common salt at the rate of one pound to one gallon. As soon as the salt is dissolved, and the liquid is still hot, apply it by means of a watering can.

2.—White arsenic	pounds	1
Washing soda	"	2
Water	gallons	3

Boil and dilute with from two to three times its volume of water. Apply while still warm in fine weather. This solution is highly poisonous.

3.—Blue vitriol (bluestone)	pounds	2
Water (hot)	gallons	6

Put the bluestone in a crock or wooden tub and pour on the water. Use while still hot.

4.—Sulphuric acid in the proportion of one part of acid to 1,000 of water has also been effectively used where the soil does not contain any appreciable amount of carbonate of lime. If there is effervescence when the acid solution is sprinkled on the path (showing the presence of carbonate) this preparation will be of no value.

5.—Salt cake, or acid sulphate of soda, a by-product in the manufacture of muriatic acid, applied in solution (one pound to one gallon) is very effective.

With respect to the use of any of the foregoing, it may be pointed out that thorough applications, especially at the beginning of the season, are to be advised, rather than lighter and more frequent doses. All these chemicals will do serious injury to soils intended for cultivation.

THE COLE BUTTER-MAKING PROCESS.

This method or process consists simply of blowing air (previously warmed by water to a temperature between 70° F. and 80° F.) through the well-ripened cream, contained in a cylindrical glass vessel, 21 inches high and 13 inches in diameter.

The apparatus consisted of a double-acting air pump (worked by a belt from the shafting) which forced air to the bottom of a copper vessel, 13 inches in diameter and 16 inches high, containing water at a temperature of 85° F. to 90° F. After passing through the water, the air was conducted from the copper vessel by a piece of block-tin tubing terminating in a coil resting on the bottom of the churn. The air escaped from the open end of the coil, as well as from small holes pierced therein.

The agitation or churning is accomplished simply by the air bubbling through the cream.

To ascertain what foundation there might be for the claim of the inventor or promoter that 20 to 30 per cent more butter could be obtained by this method than by any other, and to learn what merits, if any, this process might possess over that ordinarily in use, two series of experiments were made last November. The first had for its object more especially the tracing of the butter-fat from the beginning to the finish of the process. The plan adopted and the analytical methods used were such as to yield data of an exact character, and consequently would show any loss or gain in butter-fat during the ripening of the cream in the period previous to churning or during that operation. The second investigation was undertaken with a view of obtaining data regarding the economy of this process as compared with that in general use. All the work was most carefully done, and, as already stated, only the most accurate and approved chemical methods were employed for the analysis of the cream, buttermilk and butter. Final results only will be here recorded, in order that this report may be presented in as concise a form as possible.

Experiment 'A.'—On November 22, 1899, a quantity of cream was set aside in the usual shot-gun can to ripen in the dairy, the temperature throughout the ripening period being maintained at about 70° F. As directed by Mr. Cole, the cream was stirred at intervals until the 27th, when the churning was made. The data respecting the weight and composition of the cream, and the total amount of fat present on November 22, are as follows :—

Weight of cream	pounds	13·9
Fat in cream	percentage	28·54
Fat in cream	pounds	3·96

On November 27, immediately before churning, the cream was again weighed and analysed, and afforded the following data :—

Weight of cream	pounds	13·81
Fat in cream	percentage	28·33
Fat in cream	pounds	3·91

Comparing these with the foregoing figures, it will be seen that there was no increase in the amount of butter-fat during the ripening of the cream.

The churning (November 27) was made in twenty minutes, the directions furnished by the promoter being followed as closely as possible. After the butter had been carefully collected, the buttermilk and subsequent wash-waters were mixed, weighed and analysed :—

Weight of buttermilk	pounds	160
Fat in buttermilk	percentage	0·124
Fat in buttermilk	pounds	0·198

From the above figures and those preceding, it can be shown by calculation that 5·07 per cent of the total fat supplied in the cream appeared in the buttermilk.

The data respecting the butter obtained may now be cited :—

Weight of butter	pounds	4·5
Fat in butter	percentage	82·15
Fat in butter	pounds	3·696

The following statement summarizes the results : —

Fat in cream as churned		pounds	3·91
" buttermilk	pounds 0·198		
" butter	" 3·696		
	pounds 3·894		

It is thus seen that practically all the fat present in the cream immediately prior to churning was accounted for, and, further, that there was no increase in its amount — due either to fatty degeneration of the albuminoids or absorption of atmospheric oxygen, as claimed by Mr. Cole—either prior to churning or during the churning process.

Experiment 'B.'—November 28, 1899 : A quantity of cream having been ripened in accordance with the afore-mentioned directions, was thoroughly mixed (so as to be uniform in quality throughout), and divided ; half was churned by the Cole process, and half was churned by the farm dairyman in the churn ordinarily used in our dairy. The data are tabulated as follows :—

By Cole Process—

Weight of cream	pounds 27		
" butter obtained	pounds 8·125		
Fat in butter	percentage 83·48		
Fat in butter		pounds	6·912
Buttermilk and washings	pounds 130		
Fat in buttermilk	percentage 0·26		
Fat in buttermilk		pounds	0·338
Total weight of fat		pounds	7·25

By Ordinary Method—

Weight of cream	pounds 27		
" butter obtained	" 8·656		
Fat in butter	percentage 84·25		
Fat in butter		pounds	7·29
Buttermilk and washings	pounds 20		
Fat in buttermilk	percentage 0·2		
Fat in buttermilk		pounds	0·04
Total weight of fat		pounds	7·33

Percentage of the total fat supplied in cream, as found in the buttermilk by Cole process	4·61
Percentage of the total fat supplied in cream, as found in the buttermilk by ordinary method	0·54

It is thus evident that we were unable to obtain as much butter by the Cole as by the ordinary method, and, that there is a much greater loss of fat in the buttermilk by the former than by the latter process.

The whole process, from first to last, was carefully watched by Mr. Grisdale, the Agriculturist, who begs to submit the following statement respecting the method and the quality of the butter produced :—

'A number of carefully carried out trials of the Cole butter-making process have been made in the dairy of the Experimental Farm under my direct supervision, and as a result I have no hesitation in saying that in point of efficiency or economy this newly introduced method has nothing to recommend it. It is quite apparent that there is a very much larger loss of butter-fat in the buttermilk than by the ordinary methods.

'Regarding the quality of the butter, we have to state that while it was not unpleasant to taste when first churned, it soon developed a strong flavour, which became more and more marked until at the end of two weeks it was quite unpalatable, though it could not be classed as rancid.

'In texture, it is very fine-grained with a slight greasiness apparent, which would detract much from its commercial value. The claim advanced by Mr. Cole, that a uniform and constant flavour would be ensured by his process, is not sustained; butters made at short intervals—say, of a few days or a week—differed very much in flavour from one another, and we are of the opinion that the ripeness of the cream influences the flavour as much when churned by this method as when handled in the regular way.'

Being desirous of furnishing our readers and correspondents with the opinions of those who were competent to speak in the matter of the reputed increases of fat during the ripening or churning of cream—opinions which we felt sure would support the position we had taken, that there was no appreciable increase—we sent the following letter to Dr. S. M. Babcock, Chemist, Experiment Station, Madison, Wis., and to Dr. L. L. VanSlyke, Chemist, Experiment Station, Geneva, N.Y., both dairy chemists of wide repute :—

'Have you in the course of your work ever made any investigation regarding the reputed formation of butter-fat from albuminoids during the ripening of cream or cheese ? If you can furnish me with any data, or refer me to any recent work on this point, I shall feel greatly obliged, as we have at present under examination a butter-making process, the inventor of which claims an increase in the amount of fat from this cause.'

Their replies are as follows :—

'Yours of November 23 in relation to the formation of fat from albuminoids in the ripening of cream or cheese, is duly received.

'I know of no recent investigation on this point, but am certain that the general opinion among investigators is that there is practically no change of fat through the fatty degeneration of albuminoids in either cream or cheese.

'(Sgnd.) S. M. Babcock.'

'In reply to your inquiry of recent date, I would say that we have paid special attention to the possible formation of fat from albuminoids during the ripening of cheese and we have never found any evidence whatever that such change takes place.

'(Sgnd.) L. L. VanSlyke.'

From time to time farmers and dairymen have brought before them by interested, if not dishonest, persons, methods, recipes, or materials the employment of which it is claimed will effect a larger yield of butter from a given weight of cream than can be obtained by the ordinary process. Several of these methods have been examined in

the laboratories of the Experimental Farms, with the result, as might be expected, of proving them worthless and fraudulent. In most instances there is a direct failure to obtain a larger yield of butter—and in those in which a somewhat greater weight of product results, the increase has been shown to be due to the presence of excess of water or curd, or both, rendering the article one which the law considers adulterated. Further, such so-called butter, even when freshly made, is far inferior to ordinary good butter, and having exceedingly poor keeping qualities, soon becomes altogether unmarketable.

We know as a scientific fact that the ordinary methods in use in our dairies and creameries, if rightly conducted, practically abstract all the butter-fat, and we also know that there are no means for increasing the butter-fat in cream by the addition of foreign materials, by absorption of oxygen, or by conversion of the albuminoids, as claimed by many of those having methods for sale. Any addition to the weight of butter by artificial means must come from the admixture of curd or water, or both—and such, as we have already stated, do not yield either a legal or marketable butter, but a product which will bring trouble and loss to the maker.

It is all important to the dairying interests of the Dominion, more especially as we are now building up a large and valuable export trade in butter with Great Britain, that we should have nothing to do with any of the methods here alluded to.

WATER FROM FARM HOMESTEADS.

Of the 75 samples of water received during the past year, 41 have been submitted to complete analysis ; their data are recorded in the subjoined table. The remaining samples were not examined either owing to the quantity of water being inadequate, dirty bottles, or old and used corks having been employed. In order to avoid disappointment and unnecessary expense, farmers and dairymen wishing to avail themselves of the privilege extended in this matter, should first write for instructions on the collection and shipment of samples, furnished on application, so that the water when received will be in such a condition that a reliable analysis may be made.

The analysis of mineral waters and examination of waters for medicinal purposes is not undertaken ; it is only samples from farmers' wells and dairies that can be received, and these must be taken in accordance with the directions already referred to, and the express charges prepaid.

The waters comprise 21 samples from Ontario (of which 10 were reported polluted, 5 suspicious and probably dangerous, and 6 as free from contamination) ; 5 from Manitoba ; 4 from the North-west Territories ; 3 from British Columbia ; 3 from Quebec ; 3 from New Brunswick ; 1 from Nova Scotia.

Much has been said in past reports of this Division on the danger to the health of the farmer and his family in using water contaminated by organic filth, and also as to the effect of such water upon the thriftiness and health of his live stock. We have also pointed out how essential pure water is for creameries and cheese factories, for without it first-class products cannot be obtained. The following paragraphs, taken from a former report of this Division, however, may be worthy of repetition, as showing how well water may become contaminated:—

'The most common cause of well pollution has been the sinking of the well in the barn-yard or under one of the farm buildings. We object to this practice on principle and hold that only under the most exceptional circumstances can it be followed with impunity. From our experience, it would appear that in the majority of instances it is only a matter of time before such wells act as cess pits. Unless most careful provision is made to prevent the liquid manure from soaking into the ground, it sooner or later, according to the nature of the soil, finds its way into the well. If this be so, it behooves all farmers and dairymen to locate their well at a safe distance from such infecting sources.

ANALYSIS OF

RESULTS STATED IN

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.
			1899.				
1	St. Marys, Ont	J. S	Dec. 7	None.	·12	·033	2·2
2	Urquhart, Alta.	H. R. F	" 14	·024	·063	·013	18·2
3	Hanover, Ont	J. J. W., No. 1.	" 14	·138	·09	2·620	6·4
4	"	J. J. W., No. 2	" 14	·175	·105	3·639	10·2
5	Wheatland, Man.	J. A. N	" 26	·10	·31	1·087	178·0
			1900.				
6	McKenzie, Man	W. W	Jan. 4	None.	·69	·115	58·0
7	Sonya, Ont	J. W	" 11	Traces.	·20	2·784	78·0
8	Granby, Que.	W. K. per Dr. M. C. B.	Feb. 6	·195	·065	·827	1·30
9	Chilliwack, B.C	A. E. W	Mar. 7	None.	·160	Traces.	·60
10	Fulton, Ont	T. T., No. 1	" 15	·137	·387	·630	·90
11	"	T. T., No. 2	" 15	·012	·287	936	3·50
12	Barrie, Ont	F. McT.	" 24	·045	·160	2·994	7·50
13	Melita, Man	J. W	" 29	·512	·31	·336	15·0
14	Auburn, Ont.	W. D	April 19	·025	·12	2·928	6·2
15	Grenfell, N.W.T.	F. E. D	May 2	·070	·29	2·758	33·5
16	Morris, Man	J. T. B.	" 19	3·33	·23	None.	4000·0
17	Calgary, N.W.T	P. T. B.	" 23	1·11	·08	None.	6·8
18	Chatham, N.B	D. P. Co., No. 1	" 23	None.	·102	·1317	·6
19	"	D. P. Co., No. 2.	" 23	None.	·155	·0263	·4
20	Billing's Bridge, Ont.	N. G.	July 7	·23	·29	None.	14·0
21	Calgary, N.W.T	T. S. C. L. Well	" 30	None.	·095	2·142	3·5
22	Tecumseh, Ont.	Wm. McG	Aug. 1	17·85	·05	1·174	11108·3
23	Rifle Range, Ottawa, Ont	Lt. C. T., No. 1	" 13	·029	·242	·668	4·0
24	" "	" No. 2	" 13	·016	·165	4·623	10·4
25	" "	" No. 3	" 13	·016	·135	2·935	16·3
26	Pickering, Ont.	G. P.	" 20	·08	2·61	8·699	45·6
27	North Salt Spring, B.C	F. L	Sept. 15	69	·265	·1317	12 0
28	Westport, N.S	E. C. B	Oct. 1	·017	·300	·0173	48·0
29	Shellmouth, Man	W. L. W.	" 11	·156	·218	13·943	21·5
30	Sussex, N.B.	W. W. H.	" 19.	·26	1·466	·0724	8·6
31	Miller's Corner, Ont	H. W. G.	Nov. 8	3·85	·33	1·30	90·0
32	Buena Vista, Rockliffe	E. H. M	" 9	1·51	·647	·381	5·6
33	St. Catherines, Ont	F. B.	" 12	·124	·196	1·230	291·0
34	Lytton, B.C	A. L.	" 12	·01	·04	·019	Sl. trace
35	Anticosti Island, Que	Dr. D. J. S	" 12	·042	·12	1·356	23·0
36	" "	"	" 12	1·05	·104	·317	113·0
37	Deer Park, Ont	E. Q.	" 16	·035	·158	5·368	10·8
38	Tilsonburg, Ont	E. D. T., No. 1.	" 16	·014	·086	6 987	4·8
39	"	" No. 2	" 16	·016	·120	8·703	8·0
40	"	" No. 3.	" 16	·08	·277	20·282	38·0
41	"	" No. 4	" 16	·008	·117	17·082	18 0

WELL WATERS, 1900.

PARTS PER MILLION.

Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
260·0	230·0	30·0	Slight traces	Free from pollution, a wholesome water.
342·0	282·0	60·0	None	Free from all drainage matter of a pernicious character.
298·0	224·0	74·0	Heavy traces	Polluted, an unsafe water.
392·0	282·0	110·0	Traces	" a decidedly dangerous water.
2458·4	1748·8	709·6	....	Highly charged with saline matter.
7978·0	6228·0	1750·0	Traces	Highly charged with saline matter.
660·0	545·0	115·0	....	Contaminated; use attended with danger.
25·2	14·0	11·2	Traces	Water contains drainage matter.
117·6	100·0	17·6	"	A first class water; free from all pollution.
43·0	17·0	26·0	Traces	A doubtful water.
158·5	104·5	54·0	"	Not first class, possibly polluted.
264·0	192·0	72·0	Heavy traces	Indication of pollution; very doubtful purity.
1879·6	1327·2	552·4	Traces	Highly saline and unpalatable.
330·0	220·0	110·0	None	Somewhat suspicious, indication of previous contamination.
3501·0	3041·0	460·0	....	Strongly saline and probably purgative.
8256·0	6394·0	1862·0	Traces	Very strongly saline, unfit for use unless distilled.
1201·6	1052·8	148·8	None	Probably free from organic pollution, but very saline.
40·0	22·4	11·6	"	Free from pollution and wholesome.
40·0	28·0	12·0	Very slight traces	" "
608·0	428·0	180·0	Heavy traces	Highly suspicious; of very doubtful purity.
374·0	226·0	148·0	"	" " "
22751·2	....	....	....	Saline water.
64·0	32·0	32·0	Traces	Unpolluted and wholesome.
126·4	64·4	62·0	Slight traces	Good drinking water, free from contamination.
190·0	120·0	70·0	Traces	Free from pollution.
608·0	342·8	265·2	Heavy traces	Seriously contaminated.
271·2	189·6	81·6	"	Very suspicious, drainage matter indicated.
278·4	205·6	72·8	Traces	Indication of pollution, somewhat suspicious.
484·4	318·8	165·6	Very heavy traces	Very seriously polluted with drainage matter.
104·0	51·2	51·8	" "	Dangerously contaminated.
564·8	347·2	217·6	Heavy traces	Most seriously polluted.
368·0	251·0	97·0	Traces	Dangerously polluted.
2527·6	2240·4	287·2	None	Probably containing drainage matter, dangerous water.
185·2	126·8	58·4	"	Excellent water, free from injurious matter.
257·6	138·8	118·8	Traces	A water of suspicious quality.
487·2	413·2	74·0	Slight traces	Water of doubtful purity.
388·0	265·6	122·4	"	Dangerously contaminated with organic matter.
278·4	164·0	114·4	Very slight traces	Probably a wholesome water.
418·4	221·2	197·2	Heavy traces	Very seriously polluted.
576·0	363·2	212·8	Very heavy traces	Dangerously contaminated.
451·2	274·4	176·8	Slight traces	Bad water, containing a considerable amount of drainage matter.

'The greatest care should be taken at cheese factories and creameries that the waste water does not find its way into the water supply, and to insure this thorough and efficient drainage is necessary.

'Further, there is much room for improvement in keeping the buildings and barn-yards clean. If greater care had been exercised in this matter, many wells which are reeking with filth would to-day be free from impurity. Apart from the question that a dirty barn-yard means a loss of valuable plant food—a question well worthy of closer consideration—there remains the equally important fact that such is usually a menace to health through contamination of the well water.'

We are pleased to note that driven and bored wells, supplied with windmill power, are becoming more and more common. Such wells may be situated at a considerable distance from the farm buildings, and thus obtain their water from a source about which there can be no reasonable doubt as to purity.

Several of the samples received from the North-west Territories and Manitoba were found to be strongly saline, and for this reason non-potable. The chief constituents of this soluble mineral matter are common salt (sodium chloride), Glauber's salt (sodium sulphate), and Epsom salts (magnesium sulphate). A part of the latter might be precipitated by the judicious addition of lime water, but such a plan of purification is only effective when other salts—sulphate and chloride of sodium are absent. In the majority of instances, distillation must be resorted to if a wholesome, potable water is to be obtained. Small household stills, cheap and easy of management, and which can be used on the kitchen stove, are now procurable, and are to be strongly recommended to farmers in alkali districts for furnishing a supply of good drinking water, free from saline matter.

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST.

(JAMES FLETCHER, LL.D., F.L.S., F.R.S.C.)

1900.

OTTAWA, December 29, 1900.

Dr. WM. SAUNDERS,
Director of Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report on some of the more important subjects which have been brought officially before the Division of Entomology and Botany during the past season. Owing to the large increase in correspondence and the numerous species of insects and plants inquired about, it has been somewhat difficult to decide what subjects could be most usefully treated of in the present report. I have prepared articles upon those subjects concerning which I thought information would be of most service to the farmers, fruit-growers and gardeners of Canada.

Since the fitting up of a new room for the exhibition of specimens, many visitors to the Central Experimental Farm have availed themselves of the opportunity of consulting the collections which are now being gradually arranged and put into shape for reference. Many valuable additions have been made during the year to both the entomological and botanical collections.

Considerable progress has been made in the studies of the life-histories of our native insects, both noxious and beneficial, and a fine collection illustrating all stages of their development is being gradually accumulated. During the past year many specimens of inflated caterpillars have been prepared by Mr. Arthur Gibson, assistant in the Division, and are much admired by visitors.

The experiments in growing grasses and other fodder plants have been continued and are of great interest.

The Apiary, as heretofore, has been looked after by Mr. John Fixter, the farm foreman, and his report on that branch of the division work is printed at page 243.

Correspondence.—From November 30, 1899, to November 30, 1900, the number of letters, exclusive of circulars, received by the Division, was 3,017, and the number of letters despatched was 2,847.

Meetings Attended.—Meetings of farmers, dairymen, fruit-growers, &c., have been attended whenever official duties would allow of my absence from Ottawa. Addresses were delivered at the following places : Granby, Que., February 20 and 21 ; Cowansville, Que., March 14 and 15 ; St. Catharines, Ont., March 20 ; Danville, Que.,

September 5 ; Niagara Falls, Ont., December 5 and 7 ; London, Ont., November 13, 14 and 15, attending the annual meeting of the Entomological Society of Ontario. Meetings have also been attended and addresses delivered before the Toronto and Montreal branches of the Entomological Society, and also before the Toronto and Ottawa Normal School students on nature study. In June last on account of reports received from Manitoba of serious depredations on crops by locusts, and at the request of the Provincial Minister of Agriculture, I was instructed by the Honourable the Minister of Agriculture to proceed to Manitoba and investigate the matter. Accordingly, on June 21 I left Ottawa, and, having joined the Chief Clerk of the provincial department at Winnipeg, visited some of the worst affected districts. This matter is reported upon later on.

In response to a request to the Minister from the government of the North-west Territories, I then went on to Regina and joined the Hon. G. H. V. Bulyea and, in company with him and Mr. Angus Mackay, the Superintendent of the Experimental Farm for the North-west Territories, went to the Prince Albert district and held a series of farmers' meetings. Addresses were delivered upon agricultural subjects with special reference to the control and eradication of noxious weeds. These meetings were very successful, and the country traversed—a circuit of about 200 miles through a country of great fertility—was of extreme interest. Leaving Prince Albert on July 7, where the first meeting was held the previous day, we drove east and south and held meetings at Colleston, July 7, Melfort, July 9, Kinistino and Harperview, July 10, St. Louis, July 11, Lindsay and Willoughby, July 12, Rosthern, July 13, and back to Duck Lake on the railway on July 13. A supplementary and very largely attended meeting was held at the request of Mr. Wm. Trant, at Lumsden, twenty miles from Regina. Several excellent farms were examined en route and much valuable information as to the nature of the country and its suitability for various crops was acquired, which will be of much use to me in the future.

Acknowledgments.—My special thanks are gratefully tendered to the following for frequent and valuable assistance : to Prof. John Macoun, of Ottawa ; Prof. J. B. Smith, of New Brunswick, New Jersey ; Dr. L. O. Howard and Messrs. B. T. Galloway and A. F. Woods, of Washington ; Prof. F. M. Webster, of Ohio, and Mr. G. B. King, of Lawrence, Mass., for identification of specimens, and also to Prof. C. C. James, Deputy Minister of Agriculture for Ontario ; Mr. J. R. Anderson, Deputy Minister of Agriculture for British Columbia, and Mr. Hugh McKellar, Chief Clerk of the Department of Agriculture for Manitoba, for prompt notification of outbreaks of injurious insects. To Mr. R. M. Palmer, Inspector of Fruit Pests for British Columbia, and the Rev. Father Burke, of Alberton, P.E.I., I am indebted for reliable reports on insect injuries and the condition of the crops in their respective provinces, all of which have been of great service to me in making the work of the division under my charge useful to the farmers of Canada.

In conclusion I have much pleasure in testifying to the assiduity and excellence of the work performed by my assistants, Mr. J. A. Guignard, B.A., and Mr. Arthur Gibson, in office hours or afterwards whenever required.

I have the honour to be, sir,

Your obedient servant,

JAMES FLETCHER,

Entomologist and Botanist.

INSECT PESTS.

THE HESSIAN FLY
(Cecidomyia destructor, Say).

A serious outbreak of the Hessian Fly in the fall wheat fields of western Ontario during the past season has to be recorded. There was some appearance of the summer brood in the same districts, but only a few references were made to the insect, until it was found that the new crop of fall wheat was infested to a degree which has seldom been seen in Canada for many years. The district where the greatest harm was done, was in the area lying to the west of Lake Ontario, and north of Lake Erie.

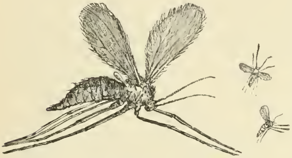


Fig. 1.—The Hessian Fly—enlarged and natural size.

Prof. Lochhead, of the Guelph, Ontario, Agricultural College, writes as follows :—

'Guelph, December 22.—The Hessian Fly is very general in Essex, Kent, Elgin, Norfolk, Haldimand, Lincoln and Middlesex ; it is reported from various parts of Welland, Lambton, Huron, Oxford and Brant. Occasional mention is made of it in Perth and Simcoe. Practically none is reported from Bruce, Grey, Wellington, Waterloo and Dufferin. The eastern half of the province is practically free from the Hessian Fly. (The above information was obtained chiefly through the reports of the Bureau of Industries.) Professor Pettit, of the Michigan Agricultural College, writes me, December 1, that this year all early sown wheat, and, in fact, all wheat sown before October 1, is infested, some of it badly. This is the case over a great part of the state. In ordinary years the third week in September is late enough to sow wheat to escape the fly, and we should not, I think, make our deductions from two such unusual years as the last were.'

'Brantford (Brant Co.), Ont., August 3.—The Hessian Fly has been bad in this neighbourhood this season. How late should I sow my wheat in order to escape the fly altogether ? Would there be any use in sowing as small a plot as half an acre on a fifty-acre farm, to act as a trap, if no neighbour sowed any wheat extra early ? What would be the best date to sow ?'—T. F. Howell.

'Waterford (Norfolk Co.), Ont., Nov. 7.—The Hessian Fly seemed to injure the sample of wheat this year by preventing some of the grain from maturing. Late sown fall wheat seems rather free this autumn, but that sown early seems to be in some cases so badly infested that farmers are talking of ploughing it under.'

'Waterford (Norfolk Co.), Ont., November 29.—I have found two fields quite close together which are affected by the Hessian Fly. The grower, Mr. James Clark, states that both fields were sown from 15th to 23rd September. In one, a field of Clawson wheat, I believe that 80 per cent of the plants contain Hessian Fly puparia, and in the other field, of Democrat wheat, about 30 per cent. You will notice from the specimens sent that the Clawson plants affected show the upper and earlier sprout generally killed, but there is an uninjured sprout growing up from the original seed. The Democrat variety, on the other hand, shows that the insect has not injured the original sprout to so great an extent, and, consequently, this second sprout from the seed has not made its appearance in so many cases as in the Clawson. With respect

to the appearance of the two fields, the Democrat looks quite green, healthy, and apparently uninjured, but the Clawson appears wilted and not nearly so green. The difference in favour of the less injured field was very noticeable. About November 8, I found no larvæ in the fields; all had changed to flax-seeds. This fall has been very remarkably free from early frost.'—N. H. Cowdry.

'Belmont (Middlesex Co.), Ont., December 4.—Fall wheat has been considerably injured in this section by Hessian Fly. Feeble wheat on poorly-prepared ground is very badly injured, portions of it being entirely killed out. Most of the wheat turned yellow, more or less, during October, owing, I think, partly to the unseasonably warm weather, causing rust to develope. Since receiving your letter, I have carefully examined many fields of wheat, and am convinced that all the damage was not done by Hessian Fly. Wheat that has a bulky vigorous growth promises to give a fair crop next year, as the stools have many comparatively sound and healthy shoots left ; after feeding the fly, they had a lot of vitality and substance remaining, but badly nourished wheat had little or nothing left after the flies had fed on them, and they are now dead, or nearly so. The summer brood did considerable damage here, both to wheat and barley. I am satisfied that the fly cut me short 100 bushels on 27 acres. Heavy crops of wheat were hardly touched by the fly ; but, where the wheat was winter-killed, or otherwise weakened and thin, it did a lot of damage Many farmers held off their sowing this year to escape the fly, but this, I think, is a mistake. Late wheat will be weak and more liable to winter-kill, and for this reason will fall a more easy prey to the summer brood next year. I believe that if wheat is sown at the right time on rich and well-prepared land, it will get a vigorous, bulky growth in the fall, and will thus be able to withstand the attacks of both broods of the fly.'—H. Pettit.

'Ferguson (Middlesex Co.), Ont., October 30.—Since reading Dr. Saunders's article in the Entomological Society of Ontario report for 1882, I have found that the suggestions there made concerning treatment for the Hessian Fly work very well. However, I have followed them again to the letter this year, working the land with the twin plough immediately after the crop was taken off, then ploughing after, and sowing from 17th to 24th September, and have now under wheat, ground that was previously sown to clover, barley, oats, and a small piece of wheat. The result in all cases is the same, the plants are full of Hessian Fly in all stages, from the tiniest mite to the flax seed state. I have also found another insect, a sort of buff colour, with legs and a proboscis, with which it probes the plants, and any plants that I have seen attacked are doomed. The Hessian Fly is so numerous this year that I have counted as high as fifteen clustered in one stalk. Yesterday, my interest in this subject being aroused, I inspected many fields which had been sown on or about August 31 up to September 29, and I find them all thoroughly infested, and to such an extent that I think the most advisable course will be to plough them under and sow a spring crop. You could do agriculturists a signal service by collecting evidence of the extent or area covered by this pest, and by giving the results publicly in the press, describing the habits of the fly, and particularly how often reproduction takes place. By doing this, farmers would be in a position to judge of the advisability of leaving their fields, or of ploughing up and resowing with oats or some other spring crop. It would also give them an opportunity to provide seed, which is at a late date, like spring ploughing, for instance, both difficult to get and often dear.'—John C. Wallis.

'Binbrook (Wentworth Co.), Ont., December 4.—I mail you to-day two samples of fall wheat, one sown on September 10, and the other September 13. They are both of the same variety, Long Amber. This is a fair sample of the wheat in Wentworth county.'—E. J. Duffy.

The samples sent were found to be pretty badly infested with puparia of Hessian Fly. In the first parcel of 22 plants, 3 of them were crowded with flax seeds, but 19 were uninjured. In the second parcel, 12 were infested and 14 uninjured.

'Waterford (Norfolk Co.), Ont., December 3.—In the townships of Townsend and of Windham, the Hessian Fly will nearly ruin the whole wheat crop. My wheat is half dead now, but some of it has started up from the root again. I have counted as many as nine flax seeds on one stem. I sowed my wheat on September 19 and 20. I do not think there will be half a crop of wheat. Some farmers sowed earlier and some later, but their wheat is as bad as mine.'—William Schram.

Every plant sent with the above letter was heavily infested, and the roots were apparently quite dead, with no appearance of new shoots being thrown out, as in the case of the plants sent from the same place by Mr. Cowdry.

'Glencoe (Middlesex Co.), Ont., December 4.—The fall wheat is so badly killed that there is very little left. There will be hardly a field left by spring. I sowed my first wheat on September 14, and on the 18th I sowed another field. The field I sowed last is the worst I have, but it is a weak growing variety called Kansas Turkey Red. All the rest of my wheat is Dawson's. One of my neighbours sowed September 1; all is gone. Another sowed on October 1, and this is not affected so far as I can see, but it did not make much top. I was about 40 miles west from here, and I saw a great amount of the wheat affected. Some was not up which was sowed very late. I sowed a field for one of my neighbours on September 19 on a gravelly loam. There is not a single green leaf left in the field. I notice that there is a little more greenness on the heavy clay than on the loam, gravel or sand. We had no frost until very late this year.'—James Glasgow.

The samples sent by Mr. Glasgow were all badly attacked, and about equally, by the Hessian Fly (every specimen of which was in the flax-seed state) and by the Wheat-stem Maggot (*Meromyza americana*, Fitch), all in the larval state.

It will be seen from the above letters, which cover all the points brought forward in other letters, that there are two features about this year's attack by the Hessian Fly which are unusual. In the first place, the severity of the outbreak, accompanied by a remarkable number of puparia in each stem, and the late date at which the flies were active and laying their eggs this autumn, thus necessitating at least a delay of one week more beyond the usual date recommended for safety, viz., the third week in September, before it will be safe to sow fall wheat and have it free from the attack of this enemy. From correspondence and a personal investigation of the fields in the Niagara Peninsula made early in December, this year, it was apparent that late sowing was attended with very beneficial results. Owing to the open and mild autumn this year, it was possible to sow later than usual, and several fields sown in the beginning of October were much freer from attack than those which were sown at what was considered to be the proper time, namely, the end of August or the beginning of September.

For many years previous to 1899 the Hessian Fly has done very little harm in Canada to fall wheat, and as a result of a great many experiments which are being carried out every year by the members of the Ontario Experimental Union, and other progressive farmers, it had become well known that the best crops were reaped from fall wheat sown at or before September 1. This, therefore, had given rise to the opinion that the proper time to sow fall wheat was at or about the date mentioned. This, however, is only true in such seasons and localities as the Hessian Fly and Wheat-stem Maggot are not abundant; but in periods when these two serious enemies increase, as has been the case during the present season and last year, it will be found that the proper season to sow fall wheat and rye is subsequent to the time when the egg-laying females of the autumn broods of both of these insects have disappeared. For a year or two, at any rate, it will certainly pay farmers to acquaint themselves better with the life histories of these insects and the remedies which have been found successful in preventing the losses due to their attacks.

The life history and the remedies for the Hessian Fly have been frequently given in the reports of this Division, and were fully treated in last year's report, but it may be well here to again give a short synopsis of these.

Attack.—In autumn a few small whitish maggots, oval in shape, generally showing a green stripe in the centre, may be found in the root shoots of fall wheat. Later these harden and turn brown, when they resemble small flax seeds. During May and June of the following spring, the so-called Hessian Flies, small blackish midges, with smoky wings and about ⅛ inch long, appear and fly to the fields of growing wheat, where they lay minute reddish eggs, singly or in small clusters, on the upper sides of the leaves. The young maggots, after hatching, work their way down inside the sheaths of the leaves and feed at the bases of the joints. The presence of the puparia, or flax seeds, can usually be detected by the breaking down of the stem at the point where these occur, owing to the weakening of the stem by the attacks of the maggots. The flies from this summer brood appear in September and lay their eggs upon the leaves of the young fall wheat. This is called the autumn brood, and is the one which has done so much harm this year.

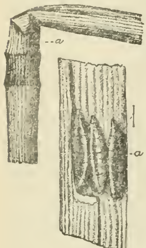


Fig. 2.—Hessian Fly; injured wheat-stem; three puparia enlarged.

Fig. 3.—Hessian Fly: puparia—natural size and enlarged.

Remedies.—1. Late Sowing.—The most important preventive remedy against injury by the Hessian Fly is the postponement of seeding until the end of September. By this means the appearance of the young plants above the ground is delayed until after the egg-laying flies of the second brood are dead. Where fall wheat has been sown in August, as is frequently done, the plants are well up and ready to receive the eggs of the flies when they emerge from the flax seeds of the summer brood. It is sometimes advised to feed off the green tops to a certain extent with sheep during the months of September and October, in which way it is claimed that many of the eggs are destroyed. I have never been able to prove that there is any advantage in this method other than giving a supply of good fodder at a time of the year when this is sometimes short. The chief objection to sowing so late as the end of September is that, as a rule, the plants have not time to make vigorous roots and tops so as to withstand the cold of severe winters. This, however, is seldom true, and in a great number of experiments, even at Ottawa, I have frequently found that good crops can be obtained from wheat sown much after the first of October, and while the Hessian Fly is abundant I believe that it is the very best policy for farmers to sow their fall wheat rather by the first of October than by the first of September, for although they may get a slightly smaller yield, it is better for them to be content with this and to be sure of it, than, in the effort to get a bigger crop, perhaps run the risk of losing half or even more from the attacks of the Hessian Fly. On this question of the proper time to sow fall wheat, the following from Prof. F. M. Webster, the State Entomologist of Ohio, who for a great many years has made a special study of the Hessian Fly, is of interest :—'I think the proper time for sowing fall wheat is late September. Early sown wheat will surely invite the attacks of the fly, and, while in years when this is not abundant the wheat may go into winter in better condition than that sown later, I believe that ordinarily this will not be the case. Your idea of choosing vigorous growing varieties and sowing late, on land prepared in the best possible manner is, to my mind, the right one. I think that in fall wheat the spring brood of Hessian Fly generally selects the younger tillers. I have observed in many cases that at harvest, what from appearances seemed to be tillers that had made the least growth in the fall, were attacked by the fly in the spring and another stem had been formed. Still, I do not think that any fixed rule can be laid down with regard to this. I believe that the Hessian Fly in spring will lay its eggs upon any stem or tiller that promises a good food supply for the young.'

2. Burning Refuse.—Many of the flax seeds of the summer brood are carried with the straw, and at threshing time are dislodged and fall down with the rubbish beneath the machine or are left in the straw. All dust and screenings should, therefore, be carefully destroyed, and all straw and small seeds should be either used during the winter or burnt before spring.

3. Treatment of Stubbles.—Most of the puparia of the summer brood are placed so low on the stems that they are left in the stubble when the wheat is cut. A large proportion of these give forth their flies in September, but some pass the winter in the stubble. An effective way to destroy these puparia is to plough down the stubbles deeply as soon as possible after the crop is cut, so as to place the insects so deep beneath the earth that the delicate flies, when they emerge, cannot reach the surface.

4. Trap Crops.—A method of reducing the numbers of the Hessian Fly, which is little practised, but which is spoken highly of by those who have adopted it, is the sowing of narrow strips of wheat in August, which will attract the females to lay their eggs, and which can afterwards be ploughed down. What is practically the same plan, is to run a harrow over fields as soon as the crop is cut, so as to start the volunteer crop from grain which has dropped in harvesting and induce a growth of wheat on the field sooner than otherwise would be the case.

5. Fertilizers.—When it is found that a young crop of fall wheat is only lightly infested, it is sometimes possible to stimulate the growth of the plants in spring by making a light application (so as not to cost too much) of some quick-acting special fertilizer such as nitrate of soda.

In cases such as we have many of in our fall wheat fields this autumn, where the attack is irregular in its occurrence, it will frequently be rather a difficult problem for a farmer to decide what his wisest course is. When, as is generally the case, there are patches in a field which have been destroyed, it is desirable to save such parts of the field as are uninjured. These patches can be sown in spring to some crop which will not require cultivation during growth, e.g., an early ripening barley, which can be cut at the same time as the fall wheat and the whole threshed as mixed feed. If, however, it is necessary to save the wheat separately, peas may be sown on these patches, and either the peas can be cut after the wheat, or the grain can be separated after threshing. In cases of bad infestation it would sometimes pay better to use the land at once for some other crop. It will, however, be necessary to replough the land deeply so as to bury the flax seeds too deep for the flies to get out, and then lay their eggs for the summer brood on spring wheat or the remnants of the crop of fall wheat. Unfortunately, the usual practice is merely to cultivate deeply, so as to produce a good seed bed. After reploughing, any crop may be sown except spring wheat. Barley and rye are also sometimes liable to attack, consequently other crops are preferable to barley or spring rye, such as oats, peas, corn or roots. There will also sometimes be cases when the farmer is uncertain what it is best to do, owing to the occurrence of uninjured patches in an otherwise badly infested field. In these cases, it will be best to wait and see how the wheat will turn out. If at last something else has to be substituted as a crop, probably the best returns will be obtained by sowing early-ripening corn, where a cultivator can be used, or early peas, where the patches are surrounded by wheat. Both of these crops may be sown as late even as the middle of June, and will usually give good results.

In the summer of 1899, as recorded in my last report, there was a remarkable outbreak of the Hessian Fly in the spring wheat crop throughout Manitoba, amounting to from 5 to 25 per cent of the crop. It is satisfactory to be able to record that there has been no recurrence of this outbreak during the past season. Mr. Hugh McKellar, Chief Clerk of the Department of Agriculture, writes under date December 18: 'I have much pleasure in advising you that this department did not receive any information this season, of the presence of the Hessian Fly in any part of the province.'

WHEAT-STEM MAGGOT

(*Meromyza americana*, Fitch).

Although the injury by this insect is not known to have been very serious during the past season, specimens have been sent in from a good many different places. It has been found attacking fall wheat in western Ontario in company with the Hessian Fly. The larger number of complaints and inquiries have come from Manitoba, and the North-west Territories, where the 'dead heads' caused by the summer brood had attracted attention and were thought by many to be the work of the Hessian Fly. The remedies for the Wheat-stem Maggot are practically the same as those for the Hessian Fly.

THE WHEAT-STEM SAW-FLY

(*Cephus pygmaeus*, L.).

This insect was reported from a few places in the North-west Territories during the summer of 1900, but no widespread injury was attributable to its attacks. Specimens were sent in from three places, and I have to thank my correspondents for taking a great deal of trouble in securing specimens and information concerning this interesting insect, which in any year may develop into a serious pest. A pretty full account of the insect and its life history was given in my report for 1896, when the most serious attack which has yet been recorded in Canada, was reported upon. This was at Souris, Man., on the farm of Mr. William Wenman. Mr. G. S. Tuxford, of Buffalo Lake, near Moose Jaw, Assa., has reported every year since then on the occurrence of the insect, and this year reports a serious outbreak, as follows :—

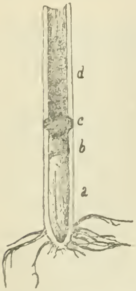


Fig. 4.—Wheat-stem Saw-fly ; *a*, cocoon; *b*, borings.

'Buffalo Lake, Moose Jaw, August 9.—Last summer I wrote you that there was not much sign of the Wheat-stem Saw-fly. Later I had to write again saying that some fields were rather badly attacked. This year, in our immediate neighbourhood of Buffalo Lake, the pest is assuming very serious proportions. We have just started wheat-cutting, and some fields especially all along the outside have from 20 to 40 per cent cut off and lying down. Our grain is ripening very rapidly this year ; a great deal is dead ripe now. We had four heavy rains on the 5th, 6th, 7th and 8th instant. Crops are from good to very good, though some fields sown on stubble will not give more than ten bushels to the acre.'

'September 18.—I have been trying to find some more stubbles in which the grubs of the Wheat-stem Saw-fly were hibernating ; but, owing to the early harvest, the late date of your request, and the many heavy rains, I find after many searches that it is impossible now to find any. At the end of July and early in August, it was very easy to trace and unearth the grub. I am sending you, however, a number of samples of the cut-off stems and heads. This is the same pest I complained of in the fall of 1897, and of which I then sent you samples. I remember you then advocated as one remedy, burning the stubbles in the fall. As the grub retires below the surface, would not this still leave it untouched ? It would be very difficult to get over a large area of ground by fall ploughing out here where the fall is so short.'—GEO. S. TUXFORD.

It will be remembered that all wheat in the North-west is spring wheat.

The early date at which this wheat was ripe, August 9, was doubtless due to the dry hot season. This also accounts for the small yield mentioned by Mr. Tuxford, of fields sown on stubble. The advantage of sowing on land summer fallowed, as a means of retaining moisture, was very marked in the West last season. The injury by insects to an infested field being most severe on the outside, is not an unusual

circumstance and merely shows the readiness with which flying insects settle down and deposit their eggs when suitable food for their young is found.

The work of the larvæ inside the stems sent from Buffalo Lake was plainly noticeable, and the Wheat-stem Saw-fly was undoubtedly the cause of the stems being cut off.

As pointed out by Mr. Tuxford, the larva does burrow down very deeply into the base of attacked stems ; but I think that the burning over of stubbles will be found a very useful remedy against this insect. Fall ploughing in most seasons in the West is difficult, owing to the lack of moisture; but where the Wheat-stem Saw-fly has been abundant, it is important that wheat should not be sown on stubble land unless a good burn has been secured, and if possible the land should be ploughed deeply either in fall or spring. Summer fallowing every other year as is done by many faimers at Moose Jaw, and doing the work early, before the middle of June, will do much to control this insect.

'Cottonwood, Assa., August 13.—Can you tell me the cause of my wheat being cut down in this way? As you notice, it is fully ripe. It was grown on summer fallow. We have had heavy rains lately, which probably accounts for so much being broken down. I shall be grateful for any information which will help me to destroy this grub.'

'August 31.—I undertook the search for the specimens you asked for, this afternoon, and although there were any number of cut-off wheat stems scattered on the field it was difficult to locate the lower end, as nearly all seemed to be gnawed off at a level with and sometimes below the ground.'—Harold D. Buchanan.

The wheat here referred to was injured by the larvæ, and was merely broken off by the wind and rain. The stems were cut off mostly at the surface of the ground, and the larvæ would have been destroyed in these instances by burning over the stubble.

'Osler, Sask., August 7.—In searching for more specimens of the swollen stems which we have been communicating about, I found to-day one fallen straw in which there was a small worm about ⅜th of an inch in length; it was at the broken point, but immediately below the joint, with no appearance of a swelling on the stem. I think this is a different trouble from that which causes the swollen stems.'

'September 15.—I was much interested to hear that you had found a specimen of the Wheat-stem Saw-fly larva in the wheat straw I sent. However, I do not think it can be at all prevalent here; for, while searching around so much for the swollen stems which I sent you at the same time, this was the only specimen I found which showed any trace of the work of an insect.'—Percy B. Grant.

Remedies.—The means which are to be recommended for checking the increase of the Wheat-stem Saw-fly are : The burning over or ploughing deeply of all stubbles, also burning of such straw as is not used by the following spring, and summer-fallowing in June every other year.

Undoubted specimens of Wheat-stem Saw-fly were sent with the above letters, but some other correspondents who wrote of this insect were mistaken as to the identity of the insect they complained of.

Injuries to Wheat due to Weather.

There were several curious conditions of wheat in the West last season, which can only be accounted for by unusual climatic conditions, chiefly the excessive drought, accompanied with great heat and bright sunshine in the last days of June. The ears of wheat were scalded just as they emerged from the sheath or just inside it. Shade trees which had been planted for several years were also severely injured by this unusual heat. The thermometer along the Canadian Pacific Railway through Manitoba and westward as far at any rate as Regina, registered 98 to 106 and 107 degrees Fahr. in the shade on the three successive days June 28, 29 and 30. Spruce trees

planted at various places were turned chocolate brown on the sunny side in one day, and many kinds of plants suffered severely. The injury to wheat was curiously local, but I cannot discover any other possible reason for the aborted and scalded heads in some places. Very interesting specimens were sent in by Mr. Geo. Wise and Mr. W. S. Wallace, of Shellmouth, Man., with a complete account of the injury and its occurrence on various soils and under different exposures. The affected area was eight miles long, north and south, and one mile wide. The injury to the ears was such that no theory could satisfactorily account for it, the ears being blighted and shrivelled up, sometimes at the tip, most frequently at the base, five or six florets being whitened and empty, and sometimes in the middle, with good grain forming at the base and at the tip. Frost and heat would either of them account for some of the characteristics, but not all. The injury lasted a very short time, and the chief peculiarity was that in adjoining fields grain at the same stage and apparently under exactly the same conditions was uninjured. Another curious distortion of stems of wheat plants was shown to me at Osler by Mr. Percy B. Grant, in which the stem was swollen, hardened and thickened, and as a rule bent rather abruptly so as to burst the sheath just above the top node of the stem. This attack resembled closely the work of the Joint-worm *(Isosoma)*. Mr. Grant wrote after considering the matter carefully and examining many specimens: 'My opinion of the matter is that the trouble is an excessive growth induced by the moist weather which came after a prolonged period of exceedingly dry weather.' I quite agree with Mr. Grant in this opinion, and so also do other botanists to whom I have shown the specimens.

'Osler, Sask., September 5.—I am sending you to-day a bundle of about 20 more or less injured stems ; all of these I cut off as near to the ground as possible, and all were standing except those which had broken at the injured points and fallen over. They show the swelling of the stem in various stages. I never saw this injury to wheat until this summer. Beginning with the middle of the month of June we had a spell of exceedingly hot and dry weather; the heat and drought gradually increasing till the end of the month, when nearly all the grain was out in head, although the straw was only from 6 inches to a foot high. Large patches of stubble land were materially injured by the want of moisture and, had the drought continued much longer, the bulk of the crop would have been ruined. However, about July 1, heavy rains set in, and there was an excess of moisture for nearly all the month. There was plenty of warmth in the ground, which, together with the moisture, pushed forward the growth at a rapid rate. The injured fields recovered rapidly, and those which had held their own during the dry spell sent up a rank growth. About a week after the rains began, numbers of the wheat stems were noticed to be lodged. The lodging continued for about a week and then stopped. The amount was variously estimated from one-twentieth to one-tenth, according to the field, being worst on new land (breaking) and least on summer fallow. The lodging was worst in the rankest spots of any particular field. It was always the largest stems with the largest heads which lodged. On closer examination, I found large numbers of stems still standing with the stems much swollen above the joints, and I noticed that the lodged stems were also swollen and had broken at the most distorted point. The swelling sometimes spread several inches up the stem, but in most cases was confined to one point until the stem bulged out so much that the sheath was burst and the inner stem protruded so much as to bend almost at a right angle. when it broke and was blown over by the wind. I found no lodged stems which did not show the swelling. The swollen stems which did not lodge were perhaps a little later in maturing than the rest of the crop.'—PERCY B. GRANT.

CUTWORMS IN WHEAT.

There was rather a serious outbreak of some kind of cutworm which attacked wheat fields in Manitoba. I was informed by the Department of Agriculture for that province, at the end of May last, that a great deal of harm had been done in the

Stonewall district. From Stonewall to Teulon it was reported that very few farms had escaped entirely, and in many cases the loss was serious. Mr. Arch. Woods, who lives about 2½ miles south of Teulon, had one field of 23 acres of wheat on summer-fallow three-quarters destroyed. The worms were said to clear the crop out completely, leaving the field as black as before it was sown. Mr. C. C. Castle lost 15 acres in the same way, and Mr. Mudd and other farmers in the same locality suffered to a similar extent. The caterpillars were almost full grown on May 19. Unfortunately no specimens of these cutworms were sent to the Division, so the species could not be identified with certainty. The Red-backed Cutworm *(Carneades ochrogaster,* Gn.) was abundant in Manitoba last summer, the caterpillars attacking turnips and many other low plants. The Rev. W. A. Burman reports injuries by this species at Deloraine, and Mr. A. W. Hanham informs me that this was the commonest moth at Winnipeg in the season of 1900. I have never actually detected this species attacking wheat ; but it is a well known pest of Indian corn, and it is quite possible that it may have been the culprit on this occasion.

GRASSHOPPERS IN MANITOBA.

About May 20 reports began to come in on the abundance of various kinds of grasshoppers in Manitoba, and by the end of the month the injuries had assumed serious proportions. An urgent invitation was received from the Provincial Minister of Agriculture for me to visit the districts and advise farmers. Unfortunately previous official engagements rendered this impossible until the end of June, when I proceeded to Winnipeg, and in company with Mr. Hugh McKellar, the Chief Clerk of the Department of Agriculture, visited a portion of the infested district. Through the courtesy of the Canadian Pacific Railway free transportation was provided to any part we wished to visit. Accordingly, leaving Winnipeg on July 2, we proceeded to Stockton on the Glenboro' Branch of the Canadian Pacific Railway, and then drove through the country worst infested round towards Wawanesa, Treesbank and Aweme, where we spent the night, and were hospitably entertained by Mr. Criddle, and where we received much valuable information and saw most interesting specimens of natural history objects. Leaving there the next morning, all too soon, we passed on to Douglas, another point where much harm had been done by locusts. In the afternoon a circuit was made round this place for several miles north-east and south-east. The next day I went on towards Brandon. The places in Manitoba where considerable injury was reported to have been done by locusts were along the line of the Canadian Pacific Railway from McGregor past Melbourne, Carberry, Douglas, Brandon and Oak Lake to Routledge, and south by Pipestone, Lauder, Hartney, and following the Souris river to Glenboro' and thence north-easterly to McGregor. At the time of my visit the grasshoppers were enormously abundant, but all farmers agreed that there was not at that time one where there had been one hundred a few weeks previously. I found every one well acquainted with the habits of the insects and the chief methods of fighting them. The article in my report for 1898, where all the best remedies are given, had been read carefully, but the greatest credit is certainly due to the Provincial Minister of Agriculture and his energetic Chief Clerk, Mr. McKellar, who had spared no effort in distributing information through the press, by holding meetings and circulating leaflets of use to farmers in meeting this outbreak. The farmers had responded promptly and had followed instructions well, by destroying the young insects both by burning them at night when they had collected on rows of straw spread across fields for the purpose, ploughing down stubble fields, the use of hopper-dosers, large numbers of which could be seen in all parts of the country, and by poisoning the insects with a mixture of bran and Paris green. There

Fig. 5.—The Rocky Mountain Locust.

is no doubt that the efforts put forth at this time had a very appreciable effect upon the numbers of the locusts, and much good was done in reducing the numbers during the hot dry period which prevailed throughout the month of June. The importance of ploughing down all stubble this autumn or next spring was impressed upon farmers by the Provincial Department of Agriculture, so as to complete the work of fighting the grasshoppers which was so well begun last spring. It will be noticed that the area infested this year was not the same as that which was invaded by locusts north of the Turtle Mountains during the two previous summers. A comparative freedom of those localities in southern Manitoba must be attributed, I believe, to the good work done by farmers last year. This serious outbreak was, no doubt, very much aggravated, if not entirely caused, by the dry hot season, which not only checked cultivated crops, but almost entirely prevented the growth of vegetation on the prairies. The only green thing for the grasshoppers to feed upon was the young and half-starved crops on cultivated land. Seeing the hundreds of acres in some places swept bare, I expected to find large swarms of the Rocky Mountain Locust (*Melanoplus spretus*, Uhler), but at only one place was this insect detected, and this was at Douglas. The species which were almost entirely answerable for the destruction of crops in Manitoba in 1900, were the native species *Melanopolus packardii* (Scudd.), *M atlanis* (Riley), and *Camnula pellucida* (Scudd.). These were almost in equal numbers throughout the districts mentioned, and probably the first named was responsible for the larger proportion of the injury, being a large species somewhat like the well known Two-striped Locust, but more active. It is easy to distinguish the species by the broader margin to the thorax and its bright blue tibiæ or shanks. There were many other parts of the West where grasshoppers were more than usually abundant, as is generally the case in dry seasons, but complaints were not made of their attacks on crops.

The following report from Mr. Norman Criddle, of Aweme, Man., gives a concise account of the outbreak at that place, which was one of the centres of worst attack.

'Aweme, Man., December 22.—With regard to the locusts, I forward some extracts from my note-book which may be of use to you. There is no doubt that the poisoned bran was far superior to anything else we tried. It was first used here with success by Mr. Harry Vane of this place.

April 24.—Locusts began hatching.

May 8.—Bulk of locusts are hatched.

May 14.—Several fields cleared off. Still hatching. H. Vane has tried Paris green with some success. Large numbers were ploughed under on edge of fields during night.

May 19.—Found a locust killed by Tachina flies; seven grubs found in ground beneath it.

May 24.—Locusts rapidly eating wheat.

May 25.—Locusts beginning to fly.

May 29.—Seem to have done hatching ; are not doing as much damage as formerly. H. Vane has invented a machine somewhat similar to the 'hopper-doser,' only longer. It is made of sheet-iron and burns wood. With this and a mixture of Paris green and bran, the locusts are being kept under control.

May 30.—Hopper-dosers are being used at most places with some success, though not much.

May 31.—We are using Paris green bait with great success ; we are spreading it round all the fields.

June 6.—Half the locusts can fly.

June 7.—Still a few locusts hatching. Large increase of Tachina flies in some places.

June 12.—Several people report locusts killed by Tachina flies. H. Vane reports large numbers dead and dying from Tachina flies, two miles west. There are very few here killed by them.

June 20.—Locusts have been flying south-east (with the wind) in large numbers. These were : *M. spretus* and the Lesser Migratory ; quite a lot crossed the river.

June 23.—Lots of locusts leaving. They go with every puff of wind.

June 27.—Locusts have nearly all disappeared. A tremendous lot are dead round the field, killed by poisoned bran. They can be picked up by handfuls.

June 28.—Locusts have ceased to do damage. Most of them have disappeared.

August 24.—There has been a slight migration of locusts into this part the last few days. They were of the two migratory kinds, and came from the south-east.

August 30.—There is hardly a locust to be seen.

'The mixture of Paris green mentioned above is made as follows : One part Paris green, one part salt (the locusts will not eat it without), and eleven parts of bran. Mix into a mash, adding as much water as the stuff will hold. Spread in as small lumps as possible. We generally use a trowel or thin piece of iron. Get a little of the mixture on the edge and then fling so that it will spread some 15 yards. A pound of Paris green should make enough mixture to spread a strip two miles long by 15 yards wide. Fresh stuff should be spread every two days. The poison takes from two to five days to kill the locusts, so that they are able to fly long distances before they die. They eat it much more ravenously when they are full-sized than they do when young. Everybody who tried this remedy now swears by it ; several of them were heard to say that they will never fear locusts again. I only saw one locust attacked by a hair worm ; this was about 11 inches long, and was seen in July.

'No locusts were seen to lay eggs, nor have I been able to find any eggs in the ground. Those that did most damage were Nos. 7, 11 and 13 of those I send ; the damage done by them was about even. (They are probably the same, M. *atlanis*, Riley).

'There was also a small percentage of *M. spretus*, which you identified when you were here. I saw several cases of *M. spretus* mating with *M. atlanis* (No. 11). This was noted during the migration south-east on June 20, 21, 22 and 23. During this time they got vastly thicker where before there had been very few.

'The damage done here was greatly over-rated. We lost some 50 acres out of 260, and our fields were the first attacked. Other people lost perhaps a little more which was because they did nothing to stop the advance. The locusts had been increasing here for about three years, in fact, considerable damage was done in the latter part of 1899.'

The grasshoppers certainly were answerable for much loss ; but, as compared to the rest of the province, the area where their depredations were of a serious nature was not very large. Many causes added to the loss, which at the time was generally all attributed to grasshoppers. Drought, frost, wind and gophers all did their share of the injury, and as the species most concerned were native species which occur on the prairies in some numbers every year, it is to be hoped that this was merely an exceptional outbreak of local species, which will not recur next season. The probability of this recurrence is certainly rendered less probable by the work which has been done this autumn in following out the wise suggestions as to ploughing, which have been made by the provincial Department of Agriculture.

The two most abundant species throughout the province of Manitoba were *M. atlanis*, the Lesser Migratory Locust, and *Camnula pellucida*, the Pellucid Locust.

These two latter species occurred also in considerable numbers in the Okanagan valley, in British Columbia, where bunch grass pasture lands and grain crops were reported to be seriously affected.

WHITE GRUBS ATTACKING WHEAT.

The White Grub, the larva of the June beetle *(Lachnosterna)*, is a frequent enemy of pastures, and also occurs, as is too well known, in gardens as an enemy of the strawberry, and occasionally in farm lands is a destructive pest in corn fields. This year an attack of some importance on fall wheat was brought to my notice.

'Tancred (Lambton Co.), Ont., October 10.—The White Grub is eating out the fall wheat in this locality, especially on land that is inclined to be sandy. A year ago last spring the June Bugs or Beetles were so bad that my small plum and cherry trees were nearly destroyed by them. I was in a great quandary to know how the young foliage was being destroyed ; not a leaf was allowed to grow until long after other trees were in full leaf. I examined them carefully every day, but not a sign of insect life could I find, until one night I was going to the stable with a lantern, and the thought occurred to me, I'll look at the trees and see if I can find any insect working by night, for I knew the trees, which were two years old, should be exceedingly healthy and thrifty. To say I was surprised at what I found is putting it very mildly. Every twig and limb was one mass of crawling June Beetles. I prophesied a full crop of White Grubs last spring, and sure enough we got them.'—T. H. MYERS.

Unfortunately, very little can be done when White Grubs are found attacking a crop. When the beetles attack fruit trees, spraying the foliage with arsenical poisons will destroy large numbers, and when the White Grubs are found destroying the grass on lawns some good may be done by spraying the grass freely with kerosene emulsion and then washing it in with water. The eggs of the June Beetles are laid in spring, and the young grubs hatch soon after, but do not attain their full growth till the middle of the next summer. They then change to pupæ, and soon afterwards into the perfect beetles, which, however, do not emerge until the following spring.

THE PEA WEEVIL OR 'PEA BUG'

(Bruchus pisorum, L.).

Attack.—A small, brownish-gray, very active beetle, one-fifth of an inch long, with two conspicuous black spots on the end of the body, which emerges from seed pease in autumn or in spring, leaving a small round hole. The insect is generally spoken of under the incorrect name of 'pea bug,' and infested pease, as 'buggy' pease. The egg is laid on the outside of the young pod, and the grub on hatching eats its way in and penetrates the nearest pea. Here it remains until full grown, consuming the interior of the pea and passing through all its stages, from a white fleshy grub to the chrysalis, and then to the perfect beetle. Some of the beetles, the percentage varying with the season, escape from the pease in the autumn and pass the winter hidden away under rubbish or about barns and other buildings. The greater number, however, do not leave the pease until the following spring, so that they are frequently sown with the seed.

Fig. 6.—Pea Weevil.

The perfect insects fly easily and resort to the pea fields about the time the blossoms appear. They have been observed feeding upon the leaves and flowers of the pea vines before the pods were formed, but the injury so done is inappreciable compared with the greater loss from the injury to the seeds by the grubs.

The injury by the Pea Weevil during the past season has been very serious indeed, and I wish to impress upon all pea growers in the districts where this insect prevails, the importance, or even necessity, of making a united effort to decrease this great annual loss by adopting some of the well known methods for the destruction of this pest.

The following are extracts from one or two of a great many letters on this subject:—

'Ottawa, November 26.—During the month of August I made a bicycle tour through the counties of Peterborough, Ontario, York and Brant, Waterloo, Wellington, Oxford, Perth, Middlesex, Lambton, Huron, Bruce, Grey and Dufferin. During this trip I paid considerable attention to the insect enemies of farm crops, and discussed the matter with many farmers. From my observations, I do not hesitate in saying that the Pea Weevil is the most important pest with which the farmers in the counties mentioned have to cope. I believe that the losses sustained in the province of Ontario from this enemy are such as should direct more attention to the methods of reducing or even exterminating this insect. In talking with farmers, even where the weevil has been present for a number of years, I found that neither the habits of the insect nor the proper methods of fumigating were very well understood. Farmers who a few years ago grew every year 20 to 30 acres of peas have become so discouraged that 5 or 10 is about the acreage they now grow, and many have dropped peas altogether out of their rotation.'—G. H. CLARK.

'Vellore (York Co.), Ont., August 15.—The Pea Weevil is unusually bad this year. A large percentage of the pods have every kernel punctured, and some kernels have two insects in them. Last year, in early-sown field-peas, the bugs matured very early, and at threshing time, shortly after the harvest, they were in swarms in the barn, and the men were covered with them. It was an unusually hot season, with continued drought, which, I presume, hastened the development. Late sowing may result in fewer weevils, but this method is invariably disappointing in the yield and quality of pease. Many people sow one field from year to year, but they always depend upon the early ones for the best quality of pease and straw. A heavy crop of peas has the same beneficial effect upon land as clover, but to a less degree. This result is very apparent on heavy clay lands. The much easier preparation of pea stubble for wheat-growing is of great importance to those who make a specialty of wheat, and as wheat usually does better on pea land than on other stubble, farmers cling to pea growing for the above reason, which, in my opinion, is a very good one. I have told many farmers of the plan of fumigating with bisulphide of carbon; but, when extra trouble and cost as well as some danger are entailed, it seems next to impossible to get farmers to take hold of this; if, however, you could devise some method by which public exhibitions could be given, for instance in properly fitted-up railway cars to be moved from place to place, in which farmers could have their pease treated at a small cost, I think they would soon learn the value of this method, and if it were done for one season, there would be a general clamouring for more of it the second year. A couple of years in any district would so thoroughly demonstrate the benefits as to make it become a recognized duty of every pea-grower to treat his pease, and with this united action much good would result.'—JOHN LAHMER.

'Waterford (Norfolk Co.), Ont., November 7.—There seem to be few Pea Moths here, but the Pea Weevils are very nearly equal in number to the pease.'—N. H. COWDRY.

'Belmont (Middlesex Co.), Ont., December 4.—Pea Weevils have done much harm. If a farmer treats his own seed pease with carbon bisulphide, unfortunately that does not prevent the weevils from his neighbours' fields from injuring his crop. There cannot be much good done unless we can in some way get united action. I am preparing to sow 12 acres of sod with peas next spring, for there is nothing like the pea-vine to thoroughly kill out the grass of a sod field. Before receiving your

letter I had already planned to treat my pease next year. Pease should be threshed as soon as ripe and immediately treated, before the weevil has attained full size or done much damage. If stored away in a barn and threshed in October, the bug has made its full growth and the damage is done.'—H. PETTIT.

There are many valuable suggestions in the above letters, and I am convinced that if pea-growers on a large scale, as well as those who only grow a small quantity for their own use, would regularly fumigate with carbon bisulphide, in a very few years this united effort would have an appreciable effect on the unnecessary loss which occurs every year in this important crop. I believe that most farmers in the districts where the Pea Weevil occurs are pretty well acquainted with the life habits of the insect, and also know that the fumigation treatment is effective. By following the instructions which have been frequently given, and which are repeated here, there is really very little danger ; but of course the work must be done with care. Most of our large seed-growers and seed-dealers do regularly treat their seed, but I think a change for the better might be made by doing this work earlier. Not only is the carbon bisulphide more easily vaporized in hot weather, but its effect on the insects is much more fatal than in cold weather or later in the season, when the weevils are in the torpid state in which they pass the winter. The sooner the fumigation is done after the pease are ripe, naturally, the less the seeds will have been eaten away by the grubs and injured. Moreover, by postponing the fumigation until late in the autumn, in some seasons a large proportion of the weevils will have left the pease and escaped before the operation.

Any farmer can treat his own seed easily and with perfect safety in the following way : Place the quantity of pease to be treated in an ordinary 45 gallon coal-oil barrel, which will hold about five bushels of pease. The quantity of carbon bisulphide which has been found necessary to destroy the weevil is one ounce to every hundred pounds of seed—the treatment to last for 48 hours. Therefore, for the above quantity, as pease weigh from 60 to 65 pounds to the bushel, 3 ounces would be required if the barrel were filled. The chemical may be poured right on to the pease, and the barrel must then be covered quickly and closely, first with a thick cloth or canvas which has been damped in water, and then with boards. The carbon bisulphide will not injure the seed in any way, either as to vitality or as to its wholesomeness as food. Carbon bisulphide is a colourless liquid which readily turns into vapour when exposed to the air, except in very cold weather. This vapour is quite invisible, but has a very strong unpleasant odour. It is heavier than air and therefore sinks quickly to the bottom of and permeates the contents of any closed receptacle in which it is used to free grain of infesting insects. It is, however, extremely inflammable both in the liquid and vapour form ; consequently great care must be taken not to bring any flame, not even a lighted pipe or cigar, near the liquid or barrel during the treatment. The pease or other grain must be left in the tightly closed barrel for 48 hours to destroy the weevils ; it will therefore be best to place the barrel in an outside shed at some distance from the living-house.

The late sowing of pease is certainly useful in preventing attack by Pea Weevil, but the method is not in much favour with farmers, because late sown peas in most seasons are liable to be so badly attacked by mildew as to reduce very much the value of the crop.

Holding over seed.—An easy remedy and an excellent one when only a small quantity of seed is required, is to hold over until the second year after harvesting. This must be done in close bags so as to prevent the escape of the beetle which naturally emerge before the end of the second season, and as they cannot perforate bags even when these are made only of paper, they must die ; for, unlike the Bean Weevil, they cannot propagate in dry grain. The vitality of pease is not injured to any appreciable degree by this delay of one year before sowing. At the time of sowing the seed should be examined and if necessary hand picked ; every grain which has been perforated should be discarded, as it has been proved that it is impossible to grow strong plants from weevilled pease.

The great need in Ontario to-day in this matter is concerted action among all concerned. If a few only treat their pease carefully, little good can be done in controlling this serious enemy, but on the other hand, it cannot be too often stated that, as is often averred by farmers, it certainly is not true that there is no use in one man doing what is right when others close at hand, do nothing. This is a big undertaking ; the Pea Weevil has now for many years been practically increasing year by year, and has now obtained such a foothold that it can only be controlled by stirring up public opinion to the extent of inducing everybody concerned to do something. As a means to this end, Prof. Lochhead, of the Ontario Agricultural College, makes the practical suggestion of bringing the subject prominently forward at the winter meetings of every farmers' institute in the province. This could be very easily done, the life history of the Pea Weevil is perfectly well known and has been published over and over again in official reports, both federal and provincial, as well as in agricultural journals. There is a competent staff of speakers for the farmers' institutes, and it would be almost impossible to hold a meeting in any of the pea-growing counties where there would not be several who could speak on this insect and its work, to the great advantage of many present.

There is, however, every necessity that those who discuss the matter, should prepare themselves beforehand and make it very plain which insect is being discussed. On frequent occasions when reports have been received from correspondents, I have to write to them before I can be sure which insect they mean. The Pea Weevil is the short, roundish, hard beetle which occurs, at the time when it is most often noticed, among seed pease from which it has emerged, leaving a perfectly round hole in the hollowed-out pea, in which it passed its preparatory stages. This insect is shown enlarged, and of the natural size at figure 6. The Pea Moth, as it is generally seen by farmers, is in the form of the caterpillar, usually called the 'worm,' in the pea pods, where the white caterpillars devour the green pease from the outside, leaving a ragged cavity and a mass of excrement. The perfect insect, the moth, Fig. 8, is very rarely seen. It resembles very much the Codling Moth, of the apple, but is of a general slaty gray colour instead of bronzy brown. The Destructive Pea Aphis is a soft-bodied green plant-louse, shown below, very much enlarged. These plant-lice cluster in enormous numbers at the ends of the shoots of peas, of all kinds, clovers and vetches.

THE DESTRUCTIVE PEA APHIS
(Nectarophora destructor, Jnsn.).

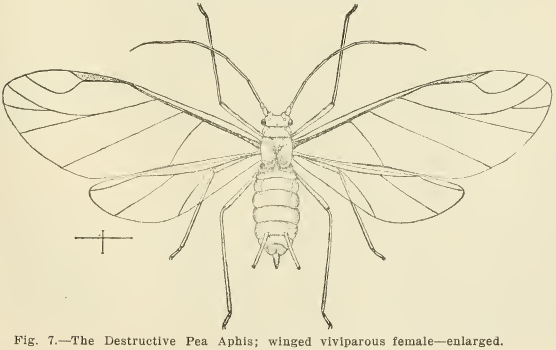


Fig. 7.—The Destructive Pea Aphis; winged viviparous female—enlarged.
(After Johnson, Md. Agr. Exp. Sta. Bul. 63.)

In my last report considerable space was devoted to the Destructive Pea Aphis, a new pest of the pea, of which no previous attack had been recorded in Canada. The injury extended from all parts of the Maritime Provinces, through Quebec to the western boundaries of Ontario, and the loss in many places was serious. Not only did it occur in Canada, but much greater injury was caused by it in certain of the United States, as Maryland, Delaware, New Jersey, New York, Connecticut, &c. Excellent work has been done upon this insect in Maryland by its describer, Prof. W. G. Johnson, and in Delaware, by Prof. E. Dwight Sanderson, both of whom have published bulletins on the subject.

In Canada during the past season, although the Destructive Pea Aphis has occurred throughout most of the districts visited by it last year, the numbers and injuries have been decidedly less. It has been discovered in the United States that this insect should perhaps be considered more particularly an enemy of clover than of peas. In Canada the species has been found only in small numbers on clover, and no perceptible harm has either been observed or reported to this crop. Wherever the Destructive Pea Aphis was observed, it was attacked to a very noticeable degree by parasitic enemies. All of the species mentioned in my last report were found during the past season in even greater abundance, and in addition to these with every outbreak the fungous disease due to *Empusa aphidis* was more or less prevalent. At Ottawa by far the most inveterate enemy of the plant-lice was the small orange larva of a species of *Diplosis* ; these minute maggots, about one-tenth of an inch in length, crawled about on the surface of the pea vines and worked very much in the same way as the larvæ of the *Syrphidae*, or Hover Flies ; creeping up to an aphis they transfixed it and held it up, raised from the surface, while they sucked out the juices of its body. The growth of these little creatures was very rapid and there were several broods in the season. When full grown these *Diplosis* larvæ spun a minute cocoon on the stem of the pea plant, or, falling to the ground, spun it there close to the surface, attaching several grains of sand to the outside. This cocoon closely resembles that of the Wheat Midge, or the tiny Cecidomyid *Lasioptera vitis*, of Osten Sacken, which emerges from the Grape Vine Tomato Gall. The winter is passed by the larva inside the cocoon. The plants most seriously attacked in Canada this year were late field peas, sweet peas in gardens and the new crop plant known as the Grass Pea, which is being grown in some districts on account of its exemption from the attacks of the Pea Weevil. Several occurrences of the Destructive Pea Aphis were watched from the time they first appeared this year at Ottawa, on July 27, until the time when permanent snow fell, and a few specimens were found on clover by digging up the plants from under the snow. Parasites of several kinds were abundant throughout the season, and a constant warfare was waged. No sooner did the aphis increase, and appear in large numbers than the parasites appeared in greater numbers and brought them down again suddenly almost to a point of total annihilation. However, at the end of the season a few specimens of the aphis could be found wherever there were chance seedlings of peas and upon late sweet peas, as well as the few mentioned above as found on clover. The attacks of this insect upon the plants where it occurs are of a very pernicious nature, the plants soon becoming stunted, and the flowers, if produced, quickly withering up. Sweet peas which were sown early and had made good growth stopped flowering as soon as the insects appeared, and late sown plants were dwarfed and made no further growth after the attack began.

Last year the worst complaints of injury came from the Maritime Provinces. This year Mr. Robertson, the Superintendent of the Experimental Farm for the Maritime Provinces, writes : 'The Pea Aphis began its work this season in Nova Scotia just about the same time as last year and it looked as if it was going to be just as destructive ; but for some unaccountable reason it disappeared all at once, though not until it had completely destroyed peas which were sown late or on poor ground, where they had a sickly growth to begin with. Such as had a strong and vigorous growth were not much hurt. I did not notice any on clover.'

The injury in Ontario is summarised in the following letter from Messrs. the John H. Allan Seed Company :—

'Picton (Prince Edward Co.), Ontario, November 19.—The Pea Aphis appeared in some portions of Ontario last year and more largely in the United States, and has done material damage to the pea crop. This season it has done considerable damage in New York State, Michigan and Wisconsin. Last season, as well as this, it caused injury in Prince Edward county, as well as in Lennox and Addington. We are also told that it did much damage in Renfrew county.'

The losses due to the Destructive Pea Aphis in the Atlantic Coast States have been shown by Prof. Johnson to be enormous, and he quotes from *The Trade*, a canned goods journal, published in Baltimore, the information that the crop of peas of the Atlantic coast this year will not exceed on the outside one-third of what it was even last year, and continues : 'This is about as serious as it can be, when it is taken into account that it is mostly due to this one pest.' . . . 'With this year's experience, however, we have shown conclusively in our experiments and practical work in the field that this insect can be kept in control to a very great extent if taken in hand in time. In the first place, the peas must be planted in rows 24 or 30 inches apart, and not broadcast or in drills, as is frequently the case.' Many remedies were experimented with by Prof. Johnson, and it was found that what he has called the 'brush and cultivator method' was the most effective remedy. For this it is necessary that the peas should be planted in rows as stated above, and when the insects are noticed the vines are brushed backward and forward with a good pine switch, in front of an Iron Age cultivator, drawn by a single horse. In this manner the plant-lice, which leave the vines quickly when these are shaken, were covered up as soon as they fell to the ground, and a large proportion of them destroyed. The operation was not repeated until the third day, as it usually required over 48 hours to destroy the insects when covered with earth. The particulars are given of an extensive experiment, where a 600-acre pea plantation was practically saved by the persistent and energetic efforts of Mr. C. H. Pearson, of Baltimore. All the methods from a practical standpoint were tried on this place, and it was found that the brush and cultivator method was the most effective. Forty men were engaged, and the 600 acres of peas were brushed and cultivated every third day for two weeks, and in this manner the entire field was saved, netting the owner from 25,000 to 30,000 cases of pease, of two dozen tins each. The year before the pease over the same area were broadcasted, so there was no opportunity of fighting the pest, and, as a consequence, 480 acres were entirely ruined. Another method which was tried with considerable success, consisted of a brush which dislodged the insects so that they fell into a pan containing coal oil and water, drawn between the rows of peas. In this way a bushel of plant-lice were caught to each row of peas 125 rods long. Spraying was tested after a thorough trial, upon 100 acres, and all sorts of insecticides for sucking insects were used, but this method of fighting the insect was abandoned, because no spray could be found which would destroy a large enough percentage of the insects to warrant the expense of the operation

THE PEA MOTH
(*Semasia nigricana*, Steph.).

This insect was unusually abundant in the provinces of Ontario and Quebec during the season of 1900. Prof. Lochhead reports it as troublesome this season in the northern counties of Ontario: Grey, Bruce, Huron, Perth, Dufferin and Wellington, but it does not appear to have been quite so destructive as usual in the Maritime Provinces, although inquiries have been received from all three provinces. Some experiments as yet incomplete may be reported upon provisionally, as they appear to be promising. Mr. J. E. Wetmore, of Clifton, King's county, N.B., was good enough, at my request, to try spraying the peas at the time the pods were forming, with the same spray of Paris green and water as is used for the Codling Moth. This experiment was suggested by the similarity of the habits of the Pea Moth and those of the Codling Moth, and although only two sprayings were given, the results were so promising as to show the importance of careful experiments being carried out in spraying peas to prevent loss from the Pea Moth. There should be at least three sprayings, the first applied when the blossoms begin to fall, the second one a week later, and the third ten days later again. As liquids will not adhere easily to such plants as the pea, owing to their waxy covering, it is necessary, after mixing the Paris green and water, 1 pound to 100 gallons, to add whale-oil soap, or some other soap, in the proportion of 1 pound to every 25 gallons of the mixture. Mr. Wetmore's report on the result of two sprayings, is as follows:—

Fig. 8.—Pea Moth: caterpillar and moth. 2 and 4, enlarged.

'Clifton, N.B., October 4.—I think that the injury to pease in this section was less this year than for a long time previously, and, therefore, it was not a very favourable year for the experiment. Early peas never suffer much from the Pea Moth, therefore I did not spray them, and they were not injured by the moth, except a few at the latter end of the pick. I mixed the spray as you directed and applied it with an Electric Sprayer, which only worked tolerably well. The first application was made on July 21, when the blossoms were beginning to fall from the pease, the second one on July 28. I did not spray again, as the pease were about ready for use, and I did not care to have the mixture on them. I gave the vines about the blossoms a good soaking. I picked the first pease for the table on August 1, half sprayed and half unsprayed, and found one caterpillar in each. August 11, tested pease again, but I could not detect any difference in sprayed and unsprayed pease. Very few pods were affected in either, not more than one in fifty. I examined them for moth several times after this, and found the number of affected pods increasing steadily in both sprayed and unsprayed towards the end of the season. There was, however, a noticeable difference between the sprayed and unsprayed at the end of the season, about 9 or 10 per cent of the sprayed pods were affected, while 20 to 25 per cent of the unsprayed were attacked. I also examined pease on my neighbours' plots and found about 25 per cent infested. This result was not entirely satisfactory to me, because the mixture failed to keep the moth off entirely, though the vines were well drenched.

'I do not think, however, that the moth always lays its eggs in the very early stages. I have found a number of very young grubs on pease ready for the table, though the majority were much older. In fact, I found all stages of growth at that period, from very young to big fat grubs.'—J. E. WETMORE.

THE VARIEGATED CUTWORM
(*Peridroma saucia*, Hbn.).

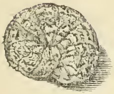


Fig. 9.

Fig. 10.

Fig. 11.

Fig. 9, The Variegated Cutworm ; Fig. 10, motn ; Fig. 11, pupa.
(All natural size.)

One of the most remarkable outbreaks of an injurious insect which has ever been recorded in Canada, occurred last summer on the Pacific Coast, extending from Oregon through Washington, and in every part of British Columbia from which reports have been received. The loss in all garden crops was enormous, and was due to the attacks of the caterpillar of one of the noctuid or 'owlet' moths *(Peridroma saucia*, Hbn.), which has been named somewhat inappropriately the Variegated Cutworm. The parent moth is known in England under the name of the 'Pearly Underwing.' Not only did this insect occur in disastrous numbers in British Columbia, but it was rather more than usually abundant in Manitoba and in Ontario. The first intimation of the outbreak was received from Kelowna in the Okanagan Valley, British Columbia, in a letter dated July 9; but every day after this for more than a month letters were received, accompanied by specimens, all of which proved to be of the same species. The following extracts from correspondence have been selected to show the extent of the injury, and are given at some length on account of the importance of the outbreak:—

'Kelowna, B.C., July 9.—I send you under separate cover in a tin box a half dozen specimens of a worm that is eating our tobacco crop quite seriously. Please tell me what they are and what I must do to destroy them.'—H. G. Watson.

Mr. Watson was written at once that the caterpillars were the so-called Variegated Cutworm, and the remedies of most use for this class of injurious insects were recommended. Immediately after this began an extensive correspondence with Mr. J. R Anderson, the Deputy Minister of Agriculture for the Province of British Columbia, who was most untiring in his efforts to distribute information as to the habits of this insect and the best means of meeting its attacks. As soon as any new feature was discovered, which it was thought would be of use to the farmers and gardeners of British Columbia, circulars and emergency bulletins were issued and distributed broadcast. I have no hesitation in saying that the prompt and energetic measures which were carried out by Mr. Anderson in this phenomenal outbreak of such a large and injurious caterpillar, with the habits of which farmers and gardeners were wholly unacquainted, was the means of saving thousands, if not hundreds of thousands, of dollars worth of crops. That the outbreak was of an unusual nature was shown by the receipt on July 20 of the following telegram from Mr. Anderson:—

'Victoria, B.C.—Wire advice on receipt my letter seventeenth. Case very urgent.'

The following is the letter referred to:—

'Victoria, B.C., July 17.—By the present opportunity I am sending you specimens of cutworm, an invasion of which has suddenly set in. They are devastating everything they come across. The first report I received from Lulu Island, where Mr. Tom Wilson found them feeding at night. This was quickly followed by reports from

Cowitchan, Chilliwack, and lastly from Saanich, the outbreak therefore is widespread, and is naturally causing great consternation. You will see that they are of various sizes, but I take it they are all the same species, although quite different in appearance. I have sent a letter to *The Colonist*, giving extracts from your reports as to the remedies for cutworms. Let me have further advice as soon as possible.'—J. R. ANDERSON.

'July 21.—I wired you yesterday asking you to advise me by telegraph as to the subject of my letter of the 17th. Since the 17th I have been deluged with reports of the ravages of these cutworms, and I have published further articles relating to their life history, the remedies, &c., taken chiefly from your reports and from Prof. Slingerland's bulletin. I went out yesterday to Mr. Wrigley's place at South Saanich and witnessed the depredations of these pests. It is truly astonishing to see the manner in which whole fields of carrots and other things are cleared off. Mr. Wrigley was spraying vigorously.'—J. R. A.

'July 30.—Your letter of 23rd inst. received this morning. I am printing part of it in an additional leaflet, giving also extracts from a letter from Mr. Brodie, of the Washington Agricultural Experiment Station. These are going to all the newspapers for publication. The infestation by this insect in Washington amounts to a plague, and I fear most root crops will be lost, as well as other green crops. In consequence of the exhaustion of Paris green in the province and adjoining states, the government was appealed to. I therefore wired you this morning to send 500 pounds.'

'July 31.—I inclose you a copy of an additional leaflet I have published. A meeting of the Victoria Farmer's Institute was held last night at the Royal Oak, for the purpose of considering the cutworm question. I attended it, and read your letter. We all wished you could have been there. The experience of those present went to show that those who used the poisoned bran as you directed were very successful in killing off the cutworm, but the numbers of these are so great that it seems almost hopeless. There was, however, after the meeting, a more hopeful spirit among those present, and I think, if we only had Paris green, every one would use it. The lawns in front of the government buildings here are swarming with cutworms. I have induced the caretaker to have them rolled. This is killing them by thousands.'

'August 2.—I was told by a gentleman from Salt Spring Island that he had noticed five cases of the cutworms devouring those which had been poisoned I am also told that some of the worms are being attacked by parasites, but I have not seen anything of this myself as yet.'

'August 6.—Paris green came safely to hand yesterday. I am now distributing it to the different Secretaries of Farmers' Institutes.'

'August 15.—I am much obliged for the specimen of *Peridroma saucia* which you have sent. This moth will be very useful to identify our British Columbian specimens by, when they emerge. None of the chrysalids have given the moths yet here, but Mr. Tom Wilson gave me one a day or two ago when I was in Vancouver, which he had hatched out. It is undoubtedly the same insect. Do you think it at all likely that another brood of caterpillars may hatch out before winter ?'

'August 16.—I inclose you a copy of a part of a letter from Mrs. J. S. Place, of Dog Creek, B.C., This is a part of the province which I do not think you are acquainted with. I think you will find the letter of great interest, as it gives the date when the eggs were laid. Mrs. Scott. the wife of the mayor of New Westminster, told me that a short time ago she noticed a number of small loopers where the light happened to fall on a light coloured patch on the carpet in her drawing room. She found that they were dropping from a curtain cord where she found the remains of a cluster of eggs. She had previously destroyed several of these egg-clusters which she had found deposited on the curtains and other places in the room.'

The following is the letter Mr. Anderson refers to:—

'Dog Creek, B.C., August 10.—We had an acre and a half of potatoes, and the cutworms ate all the leaves off in two weeks, leaving only the stalks. When they had

finished eating the leaves of the potatoes, they began to cross the fence into the vegetable garden. The fence was just covered with them. However, we cut a ditch through the garden and turned on water. They then tried to cross and were drowned by thousands. Some managed to get over on straws and bits of twigs. We have killed large numbers with Paris green and lime, but we happened to be without any Paris green, and they got a week's start of us. Now I want to ask a few questions. The 28th June was a very hot day, and we had clothes out on the line. When I gathered them in, the clothes had about 50 or 60 separate lots of eggs. I had to get a knife and scrape them off. They were a pale yellow, nearly white. I then went to look at the hops, and found there quite a lot of these egg clusters underneath the leaves. Then we began to look round and found that the same eggs were laid on the windows and all over the verandah. We set to work and got steps and crushed all we could see, which was a very large amount. I thought of sending you some of these leaves, and I am sorry I did not do so. The caterpillars have eaten the potatoes, and now they are thick on the peas and beans. They will eat the end off a pod and then eat the inside. Of onions they eat the top and then go down the stalks. Do you think that the eggs mentioned above are what the cutworms now so troublesome hatch from ?'—MRS. J. S. PLACE.

In reply to this letter, Mr. Anderson answered that he had no doubt that the eggs mentioned were those of the parent of the Variegated Cutworm, and there is no doubt he was accurate in this opinion. Dog Creek is in one of the arid districts of British Columbia, where irrigation is resorted to, and the plan adopted by Mrs. Place in preventing the cutworms from travelling by turning on water is an excellent one which has been resorted to very satisfactorily at Kelowna and Vernon, B.C., during this outbreak.

'Victoria, B.C., September 20.—I have a number of the chrysalids from caterpillars sent to me by Mr. E. A. Carew-Gibson, under date of September 2, from the 150 Mile House, now inclosed in a gauze cage. I will put them out of doors as you suggest, and place some twigs, leaves, &c., for the moths to lay their eggs on when they emerge. Mr. Gibson says in his letter accompanying the caterpillars : "I am sending you by this mail a box containing about 20 pupæ and a handful of larvæ of the year's pest—cutworms. I take it these are the same which are so bad all over the province this year. The amount of damage done and the extent of country covered seems extraordinary. At the mining camp at Horse Fly, an isolated settlement 32 miles from here, cutworms have this year completely destroyed the gardens, and have denuded potato fields of their foliage. They have been equally harmful at Soda Creek and Quesnelle Mouth. We were not able to get hold of the Paris green as quickly as it was needed, and the damage was nearly accomplished before the larvæ were much noticed. These cutworms do not seem at all particular about their diet. The handful I send were picked from under hop vines, nasturtiums and sweet peas, growing against this house." I thought that you would like to get this note of the occurrence at 150 Mile House, because it is so far out of the way.'—J. R. ANDERSON.

'September 21.—Several of the moths from Mr. Gibson's caterpillars have already emerged this morning. This surprised me, as I thought they would be much later.'

To the above quotations from a few of the letters received from Mr. J. R. Anderson, the following extracts from other correspondents, may be added :—

'New Westminster, B.C., July 21.—Cutworms are doing immense damage to all crops on the lower mainland. I have been afraid of this for some time, as I noticed the extraordinary number of common cutworm moths at "sugar". Kindly let me know at once what you advise as the best means of keeping them down. I have found that tobacco sprayed over plants makes them distasteful to the caterpillars. They are everywhere, in fields, in gardens and in greenhouses.'—W. A. DASHWOOD-JONES.

'Vernon, B.C., July 23.—We forward to-day a tin box containing sugar beet and grubs. We first noticed this grub around an old potato pit where we had potatoes

for the pigs last fall. They have destroyed about an acre of sugar beet adjoining this pit. We have them also around the house on the clover, and they have stripped the hops from the verandah. We have a few on our hop-yards, but very few. We trust that they will not increase on the hops, as they are too far advanced to spray with Paris green. We are poisoning with Paris green on our sugar beet, and also surrounding the patch with a ditch and water to try and stop them travelling. Are they likely to be worse next year.'—D. C. RICARDO.

'Comox, B.C., July 23.—I send a number of caterpillars. Please let me know all about them, as they are in such numbers here at present as to be a perfect scourge, and threaten to destroy all vegetation. They attack everything green, field crops, garden crops and house plants. They are here in millions, and are as destructive to the potato as the Colorado Beetle, but are equally so to turnips and other crops. They eat every portion of the leaf except the ribs, which they leave bare and dead. I have been all over the district, and find the pest universal. We are spraying with Paris green.'—JOHN J. R. MILLAR.

'Agassiz, B.C., July 24.—I send five cutworms. These are so plentiful that I picked five on the walk without moving a foot. They are eating the leaves of many of the shrubs, vines, &c., besides garden plants. In the orchard they have attacked the pears. In the field they are eating the fleshy outside covering of the pea pods. The only remedy I can suggest is to sweeten a bran mash and doctor it with Paris green. They are here in swarms. What can we do to protect our crops ?'—THOS. A. SHARPE.

'Froek, B.C., July 25.—I wish you could tell me how to get rid of these worms out of my garden and potato fields. The ground is just covered with them. They eat leaves, stems and everything of vegetables, and then take the root very often. They have destroyed everything for me this year, so that I shall have nothing for winter use. Is there anything I can do to prevent these things next year ? I never saw anything like them before. In the parcel I send, the small ones are picked from the stems and the big ones from the ground.'—NILS FRALANDER.

'Victoria, B.C., July 25.—The enormous numbers of cutworms have naturally reduced the food supply and made it necessary for them to change their usual feeding habits. This necessitates a corresponding change in methods of fighting them. I find them distributed all over all kinds of plants, vegetables, flowers, &c., and feeding at all times of the day and night ; in roots such as carrots and mangels, they eat holes and live inside these ; also in tomatoes ; in fact, they are everywhere. Many complaints are coming in now of their injuring fruit trees and fruit, and the loss to the farming community on their account is going to be very large. In many cases people are slow to use Paris green, being afraid of it, or use it too late. I have had excellent results where the pests are distributed promiscuously over the plants by using a Paris green mixture, dusted or blown through the entire leaf surface, one pound of Paris green to twenty pounds of flour, while the bran and arsenic mixture is effective only in certain instances. A Paris green spray is not so generally effective as the powder form, but I think this is due to the fact that many persons spray too heavily and most of the poison is washed off the plants. Reports are coming in now from Saanich that grain crops are suffering and the work of the cutworms seems almost identical with that of the true Army Worm. It is certainly the most serious occurrence of this nature since I have been in office. I shall be glad to know the proper names of the species as soon as you have reared them. I suppose there will be several different kinds.'—R. M. PALMER.

'Victoria, B.C., August 17.—It is quite a relief to know that you consider it unlikely that we shall have another plague of cutworms next year. Such an event would be indeed disastrous. My own investigations have led me to come to the same conclusions as were stated in your recent letter to Mr. Anderson, namely, that so many of the cutworms are parasitized, at any rate in some localities, that there is no reason to anticipate such a plague in 1901, as we have had this season.'—R. M. PALMER.

'Agassiz, B.C., July 27.—There is what is to me a strange feature in this attack, the cutworms are eating a number of my Thuyas. *Thuya vervaeneana* is one that they appear to be particularly fond of. There appears to be a slacking off in the numbers of these cutworms now, but this may be only temporary. However, many are going into chrysalis just under the suface of the ground. Would it be well to plough clover fields with a shallow furrow and plough or disc with a spading harrow all other fields? Would this have any effect in lessening the caterpillars or killing the chrysalids? I dislike the idea of ploughing up my clover, but would not hesitate if it would be useful. I am told that some hop yards will not pick a hop. Mr. Breed, in Saanich, is one who has no crop this year, on account of the cutworms, and they have begun on the yards here. I saw a field of four acres of potatoes this morning, and I think there is not a hatful of foliage left in the field. Ours, so far, are saved, but how long this will continue I do not know. I sprayed roots, potatoes and trees, until all my poison was gone, and now I would use poisoned bait if I could get the poison, but cannot before Monday or Tuesday.'—Thos. A. Sharpe.

'Maywood, Victoria, B.C., July 28.—I send specimens of a cutworm which is devastating the gardens and fields round Victoria. Whole crops of roots are entirely eaten up, and the corn is now being attacked. It is the most serious disaster I have seen in the eleven years I have lived here. Round five turnips in my garden I found 236 cutworms. Many farmers have lost their entire crops of carrots, potatoes and other roots. A row of sweet peas, sprayed with double-strength Paris green, was again covered 12 hours later. Nothing escapes. Carnations have every flower bud eaten out. Dahlias are eaten to the stems. We shall soon have nothing left. They have attacked the flowers in the conservatories and the tomato houses, where I have poisoned them with bran and Paris green.'—J. W. Webb.

'Victoria, B.C., July 30.—Yesterday I drove out about five miles and saw several gardens. I assure you it was a sorry sight. In some places even rhubarb was entirely stripped, only the stalks and leaf ribs being left. Potatoes were stripped to bare stalks, and the worms were eating the tubers. Some tubers had four or five cutworms in them. These latter are so abundant that they are crawling about in search of food by day.'—Geo. A. Knight.

'Langley Prairie, B.C., July 30.—The worms are destroying potatoes and root crops. Yesterday was the first day I noticed them. They have been very bad at Chilliwack.'—D. H. Nelson.

'Kaslo, B.C., July 31.—We have been suffering all through the Kootenays for several weeks past with a plague of grubs, not the ordinary cutworm, but a dark grub which has attacked all vegetables and almost all flowers. I am now trying whale-oil soap and quassia. The latter I have found the best thing for roses, but from all I can see these remedies will have no effect against this grub.'—Geo. Alexander.

'Armstrong, B.C., August 1.—The cutworms are much larger than our ordinary cutworm, and have been much later in appearing. They are doing an immense amount of damage nearly all over the province, some potato fields being about destroyed. Some people assert that it is the Army Worm.'—Donald Graham.

'Victoria, B.C., August 3.—I have one moth hatched out and many chrysalids, so I hope the worst is over for this season. Still there are many small larvæ yet.'—R. M. Palmer.

'Agassiz, B.C., August 6.—I am sending cutworms of very different sizes. I found them and the chrysalids in the same bed of garden peas. There were so many chrysalids that I was in hopes the trouble was nearly over, but, if the smaller ones have to grow as large as the big ones, it must be some time yet before they pass away.'—Wm. S. Jemmett.

'Agassiz, B.C., August 11.—The cutworm nuisance seems to be abating at last.'—Thos. A. Sharpe.

'Nanaimo, B.C., August 13.—I send you a few notes on *Peridroma saucia.* The moth was very common round my house in June, and I captured several. I do not remember to have taken it in British Columbia before. The first caterpillars I saw were in a field of potatoes at Boat Harbour, on July 15. I did not recognize the caterpillar. It is not one of our common British Columbian cutworms. Since July 15, of course, everybody has heard of it, and the damage done has been very considerable. Mangels, potatoes, turnips, &c., have been bored into, wherever near the surface of the ground. The caterpillars have travelled a little when food was scarce, and they have stripped nettles, thistles and bracken just outside fences. They have also attacked the second growth of clover, and have climbed fruit trees when planted near garden stuff. The larvæ are now pupating, and some moths have already appeared. This, I think, establishes the fact of a double brood. I collected at willows, and presume I should have taken some of the moths, had they hibernated as such.'—Rev. G. W. TAYLOR.

'Nanaimo, B.C., August 25.—*P. saucia* is now coming out of pupa state in considerable numbers. I have no doubt about two broods now, and I fear an attack of caterpillars must be expected in spring.'—G. W. T.

'Kaslo, B.C., August 16.—I made a tour through some ground which I knew had been infested with cutworms, but found that they had all pupated, so I mailed you last night a box of pupæ. These were so thick in the ground that every spade would turn up from three to nine pupæ. These caterpillars when young were blackish-gray on the back and lightish stone colour on the legs and belly, with a row of four yellowish spots on the back. After the last moult the general colour is greenish stone, and the four spots fade considerably, in some specimens they are almost imperceptible. They vary much in colour and size. If I am correct in my supposition of the moth of these pests, it has not appeared here before in any numbers. I had none of the moths prior to last spring. The last visitation of cutworms was in 1892.'—J. W. COCKLE.

'Armstrong, B.C., August 18.—I notice the chrysalids from the cutworms in constantly increasing numbers among my potatoes.'—DONALD GRAHAM.

'Agassiz, B.C., August 18.—The cutworms are gone, but the potatoes, mangels and peas have been seriously injured. In some cases, as the mangels, our crop is destroyed. The peas were lessened 50 per cent, and potatoes are defoliated to a considerable degree, but the absolute injury will not be known until they are harvested.'—THOS. A. SHARPE.

'Chilliwack, B.C., September 3.—Cutworms have been devastating our pea crop and roots. However, I have only lost about 15 acres of peas, so I consider myself lucky; but some of those I have got harvested are shrivelled and very small.'—G. MAXWELL STUART.

'Okanagan Mission, B.C., August 20.—Caterpillars did a great deal of damage here this year, but copious irrigation proved a pretty good method of controlling them.'—J. T. DAVIES.

In summing up the insect injuries of the year in British Columbia, Mr. R. M. Palmer writes, as follows :—

'Amongst insect pests occurring during the year the Variegated Cutworm has made a record of damage far exceeding anything known in the province. You have so much data from Mr. Anderson on this that it is unnecessary for me to deal with the matter at length. The crops which suffered most severely were potatoes, tomatoes, cabbage and allied plants, peas and clover. The cutworm seriously injured the apple crop in some districts, and also defoliated or cut off many young shoots of fruit trees. To prevent the cutworms from climbing the stems of fruit trees, banding them with a strip of the common sticky fly paper proved very effective, and when the Paris green and bran mixture was deposited near the base of the trees, immense numbers of the pests were destroyed. A capital plan in using the poisoned bran for this purpose, is to cover the mixture with pieces of sacking or other material, under which the cut-

worms collect, and feed—while poultry and other birds are prevented from getting the poisoned bran—a very important matter.

'There is no doubt that much of the loss caused by the cutworms could have been prevented by timely use of Paris green, but the plague was so unexpected, much valuable time was lost before farmers generally woke up to what was going on, and when the fight was fairly started, unfortunately the supply of Paris green was not equal to the demand.

'The wide circulation given by Mr. Anderson to your letters containing information as to ways and means of fighting the cutworms was much appreciated, and the methods advised were adopted generally.'

The following epitome of this remarkable occurrence of a common native species was written by Mr. Anderson at the end of the season, and will be read with interest :

'Victoria, December 3.—Regarding the cutworm outbreak which occurred in this province last summer it might appropriately be characterized, on account of its suddenness, extent and the myriads of individuals, as a veritable plague. I have not been able to ascertain how far south and east the plague extended, but it may safely be said that the States of Oregon, Washington and Idaho, and the whole of the province of British Columbia, as far north as any reports were obtainable from, were infested. The first report to this department was made by Mr. Tom Wilson, in the middle of July, he stated that the potato tops on Lulu Island were being devoured by some insect, but which, in spite of diligent search, could not be detected. Suspecting the cause, I advised looking for the culprit at night with lanterns, this was done with the expected result. Not suspecting the infestation to be widespread, I merely recommended the treatment usually followed. However, a few days later reports began pouring in from all parts of the province and bulletins were issued from time to time recommending the remedies you prescribed in your reports. The sweetened bran poisoned with Paris green, when it was used in accordance with directions, was found to be most effectual.

'Unfortunately, the supply of Paris green, not only in this province but in the adjoining states and California, was not equal to the demands, in consequence of which great havoc was wrought before a supply could be received from the East. When at length a supply was obtained, many of the caterpillars had passed into the chrysalis stage. The numbers of the caterpillars were simply incredible ; in places the surface of the ground was described as a moving mass, and where they were poisoned in any numbers the stench was unendurable. On account of their numbers and the consequent scarcity of food, they soon relinquished their natural nocturnal and non-climbing habits, and myriads could be seen crossing the dusty roads in the heat of the day in search of food ; fruit trees, if not protected, were ascended, and the fruit as well as the leaves consumed. Naturally, green succulent food was first consumed, but, as that got scarce, anything and everything was attacked ; after consuming the tops of potatoes, turnips, onions, carrots and such things, the tubers were attacked. Potatoes which were well matured and those which were quite late, escaped with the least loss ; carrots and onions suffered very severely. The potato crop was probably reduced one-third, and other root-crops in proportion. The second crop of clover was almost entirely destroyed. Grain was attacked, but no material loss resulted.

'In August the caterpillars began to enter the chrysalis stage, and their ravages began then to be, of course, much lessened. Altogether, the period of activity lasted about from six weeks to two months. A number of caterpillars which I had in captivity were all in chrysalis by the end of August or the beginning of September. A number of these emerged as moths in October, but I have not been able to discover any eggs. A large number of the moths were also caught in the grass-cutters used on the lawns surrounding the government buildings here. My observations have led me to the following conclusions, viz.: That the cutworms appeared in such abnormal numbers owing to the scarcity or absence of their natural enemies, parasites, birds, &c.; that where fowls were allowed to roam the plague was reduced to a minimum ;

that poisoned bran when used as directed is most efficacious; that parasites are increasing and will probably reduce the numbers of cutworms next season; that from good services rendered in devouring great numbers of these cutworms the crow frequently so destructive to potatoes and other crops in this province, has this year done the farmers good service.'—J. R. Anderson.

* Fig. 12.—Variegated Cutworm: moth—twice natural size.

DESCRIPTION OF THE INSECT.

The moth, which is the parent of the Variegated Cutworm, is a large species expanding from an inch and a half to nearly two inches when the wings are spread. It varies very much in colour; the forewings are, as a rule, rather dark brown, but varying to ochreous or russet-brown, shaded on the disk and toward the end of the wing with darker brown; occasionally specimens are quite light along the costal region and at the base of the wing. The wings are crossed by the usual four more or less distinct double wavy bands, but in many specimens these merely show as double spots on the costa. The reniform or kidney-shaped spot is usually darker than the orbicular or round spot, and the reniform bears a few white scales on the outer margin. In two specimens no trace of the reniform or of the orbicular can be seen. The underwings are pearly-white in the centre, with a purplish sheen, bordered broadly and veined with dusky brown, and fringed with white (hence the English name of this moth, The Pearly Underwing). The thorax is of the same colour as the forewings, and bears in the centre a tuft of raised light-tipped scales.

The eggs are laid in elongated flat patches, and were first found by Dr. Riley and figured in his First Missouri Report for 1868. In years of great abundance it is probable that these eggs are laid in various places other than on the food plant. Eggs which were most probably of this species were found upon curtains, on clothes hanging on lines, and on the woodwork of houses, by Mrs. Walton, of Armstrong, B.C., and Mrs. Place, of Dog Creek, B.C. On hatching, the young caterpillars, as is the case with some other cutworms, are loopers, and resemble the larvæ of the Geometrid moths, lacking some of the prolegs which appear in later stages. A full account of the appearance of the larva in the different stages is given by Dr. Lintner in his Fifth Report as State Entomologist of New York.

* Figures Nos. 9 and 11 have been kindly lent by Prof. Otto Lugger, and Nos. 10, 12, 13 and 14 by Prof. M. V. Slingerland.

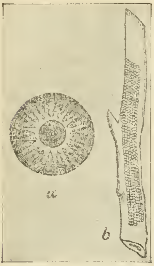


Fig. 13.—Variegated Cutworm : eggs.

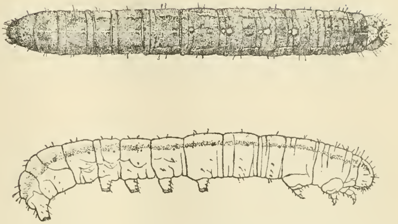


Fig. 14.—Variegated Cutworm—enlarged one-half.

The following is a description of the full-grown larva, the form in which it appeared as such a destructive enemy among the crops of British Columbian farmers and gardeners last season :—

Heavy-bodied cutworms, about two inches in length by over a quarter of an inch in width, of varying shades of gray or stone colour, the whole body finely mottled and variegated with black, gray, brown, or pinkish markings, any one of which may predominate more or less in different specimens ; many have a ruddy appearance from the ground colour of the skin being of a pinkish colour. The markings of these caterpillars consist of a conspicuous yellow band, mottled with orange, beneath the spiracles; a sub-dorsal interrupted stripe of velvety black blotches washed with orange, sometimes very conspicuous, but at others almost obliterated ; a medio-dorsal line of yellow, almost continuous from the head to the apex of the anal flap. This line expands into four or sometimes five conspicuous yellow spots, situated in the centre of the middle segments. These spots are always present on segments 4 to 7, those on 5 and 6 being the largest. There is also occasionally a spot on segment 3. The supra-stigmatal area bears on each segment, except the head, a diagonal blackish, curved, almost S-shaped mark, the lower end of each of which incloses the black spiracle. These marks form a wide, but on some specimens distinct, sinuous band between the sub-dorsal stripe and sub-stigmatal band. On segment 12, the sub-dorsal stripes meet and form a black velvety patch, somewhat like the letter W, with the lower part filled in. Behind this, on segment 13, and the posterior third of segment 12, is an orange or pale patch, sharply defined anteriorly against the straight edge of the velvety patch on segment 12. The ventral surface is paler than the dorsal and glaucescent. Head round, deeply cleft at summit, testaceous, coarsely mottled with brown or reddish markings. In the centre of the face are two curved black stripes which, starting from the summit of each lobe of the head and converging, meet above the frontal triangle, and then run down to the base of the antennæ. Thoracic feet testaceous ; prolegs concolorous, bearing testaceous chitinous plates at the base exteriorly ; claws blackish.

When full-grown, these caterpillars burrow a short distance into the ground and form a smooth oval cell, in which they change into the chrysalis or pupal stage, when they are of a bright chestnut brown, about three-quarters of an inch in length. The anterior segments following the rounded head parts and to the tips of the wing covers, are cylindrical, but the six remaining segments, as has been noticed by several correspondents, are capable of movement. These segments diminish in size to the tip, which is armed with two slender black spines, which lie so close together as to appear as one, unless closely examined with a magnifying glass. This stage for the second brood, of which the moths emerged in August and September, was from 20 to 23 days.

There is no doubt that there are two broods of this moth in Canada, as was stated to be the case by Dr. Riley, in Missouri, many years ago. The moths of these two broods appear normally about the end of June and after the middle of August ; but it seems as if some individuals of this latter brood may be delayed in emergence till late autumn, or even till the following spring. Prof. Otto Lugger writes that he has taken this moth so frequently at St. Anthony Park, Minn., very early in the spring, from March 2 to 27, that he feels almost certain that at least some of the moths may hibernate as such. He has also found them very late in autumn, after all foliage had disappeared from plants. In fact, he finds such irregularity in the appearance of this species, that they can be obtained almost throughout the season. On November 9 last, I dug up at Ottawa two pupæ which produced the moth ten days afterwards indoors. This was nine days later than the date when the ground was covered with a fall of snow, which has remained ever since, and will in all probability be here until next spring. Therefore, had these pupæ not been found, the moths could not have emerged from them until next year, showing that the species sometimes hibernates as a pupa ; but a large number of the moths, by far the largest of those reared this year, appeared by the third week in August, and it seems probable that with this species, as with a great many other cutworms, egg-laying would take place by the end of August and the beginning of September, that the young larvæ would hatch and make part of their growth before winter, or even, as in the case of *Carneades ochrogaster*, Gn., that the eggs might remain unhatched until the following spring ; it would thus appear, from the very diverse dates at which the perfect moths and caterpillars have been found, that this species may pass the winter in almost any stage, and this is doubtless the case with a great many other species, the life histories of which have not been perfectly worked out. An excellent article on the Variegated Cutworm has been published by Prof. Slingerland (Bull. 104, Cornell Agric. Exp. Stn., 1895.)

The most important facts with regard to the insect are the class of crops which are likely to be injured by it, and the best remedies with which to prevent its injuries. As to the range of its food plants, the extracts given above indicate pretty well that almost any vegetation is acceptable.

Professor French, in the Seventh Report of the State Entomologist of Illinois, says: 'The Variegated Cutworm is widely distributed, and it is probable that we have no other species that is more voracious or is a more general feeder. While some kinds of cutworms are not found much out of certain situations, this may be sought in any place during its season with a good prospect of finding it. There seems to be no cultivated crop that is free from its attacks, and when these are not at hand, it readily preys upon weeds that are found in fields and by the roadsides.'

Remedies.—The remedies for cutworms have been given so frequently in former reports that it is hardly necessary to repeat them in full here. Briefly, they consist of:

(1). The banding of freshly set-out annual plants with rings of paper or tin.

(2). The poisoning of the caterpillars either with traps of fresh vegetation tied in bundles and, after being dipped is a mixture of Paris green and water, or other poison, distributed at short intervals over infested land, when the cutworms appear. A modification of this remedy which has given the greatest satisfaction in British Columbia during the past season, is known as the poisoned bran remedy. This was first used successfully on a large scale some years ago in California as a remedy against grasshoppers in vineyards, since which time it has come more and more into use, owing to its efficacy and the ease with which it can be prepared and applied. This mixture consists merely of bran, moistened with sweetened water, and Paris green, mixed in the proportion of 1 pound to 50 pounds of bran. In making this mixture, the most convenient method is to dampen a small quantity, with the sweetened water, a few ounces of sugar in a pail of water, and then add more dry bran until the whole is almost dry again. If the Paris green is added to the bran without

dampening it, it sinks with remarkable rapidity to the bottom, even in this dry mixture, when it is stirred. If it is desired to use the poison as a wet application, more water can be added until it is of about the same consistency as porridge ; but if to be used dry, dry bran must be stirred in until the mixture will run through the fingers easily. This poison may then be applied to the land, either around or between plants to be protected, or a row of it may be run close to the drills of crops planted in that manner.

PARASITES.

The valuable aid rendered by parasites, whenever any injurious insect appears in unusual numbers, is so well known that the practical entomologist is always on the alert to detect if these are present during an outbreak of an injurious species, such as occurred in the case of the Variegated Cutworm in British Columbia during the summer of 1900. That these were present in some numbers was proved, but they seem to have been local in their distribution. They are, however, difficult to detect, and it is to be hoped that they may have been overlooked in many instances. At Nanaimo they were looked for carefully but unsuccessfully by the Rev. G. W. Taylor, an experienced entomologist, and he is of the opinion that there may be trouble again in that locality next year. The experience of the past with regard to similar outbreaks would, however, seem to justify a more hopeful view of the case. Cutworms of all kinds have many enemies, both parasitic and predaceous, and these increase with remarkable rapidity, so that two successive years marked by such an outbreak as was experienced this year would be almost without precedent. Not only will parasitic and predaceous insect enemies, and fungous and bacterial diseases have increased, owing to the large food supply, but many insectivorous birds and domestic animals, having learned how to find them, will be ready to assail them next year on their first appearance. The phenomenal abundance of the Cutworms and the widespread injury they wrought has forced farmers and gardeners to learn their habits and acquaint themselves with the most practical remedies. The following are a few extracts from correspondence bearing on the subject of the natural enemies of the Variegated Cutworm in British Columbia.

'Nanaimo, August 13.—I have boxed up a couple of hundred caterpillars of *saucia* for the sake of breeding parasites ; but they seem remarkably healthy, and I have not seen a single one attacked by Tachina Flies.'—Rev. G. W. Taylor.

'Victoria, August 17.—I send larvæ of what I take to be a parasite. The man who brought them to me said he put cutworms only into a jar, and on looking at them a few days ago, he found one dead one, killed, I think, by parasites, two chrysalids and these larvæ in an earthen hollow which had, I think, been inhabited by the host.' —J. R. Anderson.

'Victoria, August 3.—You will be pleased to learn that some of the caterpillars are parasitized by ichneumon flies, and it is reported to me from Salt Spring Island that "white eggs" (Tachina eggs ?) are on many of the cutworms near their heads.'—R. M. Palmer.

'Victoria, August 17.—Three lots of larvæ which I had under observation, were almost all destroyed by the maggots of a parasitic fly, no doubt the same species as you found in your Victoria consignment of larvæ. Field investigations show the parasites to be well distributed.'—R. M. Palmer.

'Vancouver, August 20.—I saw in a recent letter in the papers (with reference to cutworms) that you state that cutworms turn to moths. In going over a farm near here, I picked up a number of chrysalids, among others one that was just bursting, in fact the insect was partly out ; it was not, however, a moth, but a large black fly, and seemed to pretty well fill the chrysalis. The fly was not unlike a black flying ant, but with very long legs, in fact a sort of cross between a flying ant and a hornet. It had a small sting apparently. Is this a parasite of the cutworm ? I have frequently

seen these flies in the gardens and on the farms. There are a great many about just now.'—C. E. Hope.

This last important observation evidently refers to an Ichneumonid parasite. The larvæ sent by Mr. Anderson produced *Meteorus vulgaris*, Cress., a well-known parasite of all kinds of cutworms, and the flies mentioned by Mr. Palmer, as reared at Ottawa, from caterpillars sent from British Columbia, were the large muscid the Cattle Fly (*Muscina stabulans*, Fallen), of which no less than 17 were reared from one sending of caterpillars from Victoria.

'Nanaimo, August 27.—*P. saucia* is now coming out of the pupa state in considerable numbers. So far as I can see in this district, the parasites have not done very much for us. I have only seen one caterpillar attacked by hymenopterous parasites, and only a very few by diptera. Many caterpillars, however, have shrivelled up in the pupal cell without changing.'—Rev. G. W. Taylor.

Several correspondents mentioned finding the caterpillars dead on the ground, or in the cavity made in the ground by the cutworms, before turning to pupæ (or chrysalids). Some of these were sent by Rev. G. W. Taylor, who had found them in considerable numbers at Nanaimo. These were forwarded to Dr. Roland Thaxter, at Harvard University, in the hope that a parasitic fungous disease might have been discovered, but unfortunately no fungus could be detected. Dr. Thaxter writes : "I looked at the *saucia* larvæ soon after receipt, but found no sign of fungus. It is possible that it may have been bacteriosis, but it would be impossible to determine this from the material. Such cutworms are subject to *Empusa aulicae*, and I have no doubt that if careful investigation were made during one of these invasions, this or some other *Empusa* would be found destroying them.'

PREDACEOUS ENEMIES.

Wild birds were occasionally spoken of as destroying these caterpillars, but as a rule the kinds were not specified. Robins are mentioned by Mr. Dashwood-Jones, and the following letter is from Mr. J. R. Anderson :—

'Victoria, August 15.—'I am sure you will be pleased to hear a good word spoken in favour of the execrated old Crow. For some time before it was discovered that the cutworm plague was upon us, I noticed first one, then several, and then a large number of crows busily engaged among the grass on the lawns in front of the Government buildings. On investigation I discovered that they were after the cutworms, and good work they must have done judging from the assiduity with which they pursued their labours. I have since had similar reports from several parts of the province, and even the still more execrated Blue Jay has come in for a good word from some quarters. The old adage is borne out that a certain gentleman is not always as black as he is painted.'

Chickens and ducks are mentioned by several observers as having done good work. The following are among the most interesting records :—

'Victoria, July 30.—I saw a remarkable thing yesterday. There were two gardens close together with the same kind of soil, &c. One was beautiful, the other was eaten bare by cutworms. Chickens had the free run of the first, in the other there had been no chickens. In small gardens there would have been very little trouble in keeping them clean.'—G. A. Knight.

'Victoria, July 28.—I turned the chickens into the garden, giving them water, but no wheat, and they are working at the caterpillars all day, but cannot get rid of them all ; they are in thousands, every handful of soil is full of them. Ducks seem to eat even more than the chickens, but want some one with a rake to bring the worms to the surface.'—J. W. Webb.

Pigs were very useful at Agassiz.

'August 6.—I intended to put down some poisoned bran, but I found nine of my young pigs in the potato field, travelling regularly up the furrows, just moving

the earth sufficiently to get at the worms. In no case did I find the potatoes uncovered or touched ; from the look of it, the pigs must have been at this work for some days. They are about 5 or 6 weeks' old, and seem to have lived mostly on these worms. They have eaten nothing in the sty, except from the mother, until the last 2 or 3 days, and they are perfectly fat. I knew they ate a lot of raspberries, but could not see how they got so fat on them. The potato field joins the pig field, and it is my intention to turn the pigs in as soon as I have lifted the potatoes.'—WILLIAM S. JEMMETT.

As there is a possibility that the Variegated Cutworm may again appear in British Columbia next season, it will be wise for every one to be keenly on the lookout for its first appearance in any form, and to write and send specimens promptly to the provincial Department of Agriculture in Victoria, or to this Division, so that advice may be given as to the best steps to take under the circumstances to prevent loss. Observations on the occurrence of parasites, and predaceous insects, and of work done by wild birds, poultry, pigs, &c., will be of special interest, and I shall be greatly indebted to any observers who will report to me any instances which may come under their notice.

THE SPOTTED CUTWORM
(*Noctua c-nigrum*, Linn.).

Among the outbreaks of cutworms reported to this Division during the season of 1900, mention may be made of one which occurred in Ontario just at the same time that the Variegated Cutworm was doing so much damage on the Pacific coast. Injury was reported from Niagara and several places north of Lake Ontario. The moth was also extremely abundant at Ottawa from July to the end of the summer. Almost all kinds of vegetation, with the exception of the various grasses, were attacked, and the larval habits of this species seem to resemble very closely those of the Variegated Cutworm. Young larvæ in the looper stage were received from Niagara, from Mr. Joseph Healey, on June 13, who had found the cluster of eggs upon an apple tree and the larvæ were reared to maturity upon the leaves of that tree. Pupation continued from July 24 to 27, and the moths all appeared from August 18 to August 25. The following extracts refer to two of the worst occurrences reported :

'Whitby, July 25.—Upon examining some tomatoes to-day, the fruit of which is not more than half grown, I discovered that, with scarcely an exception, the tomatoes were more or less eaten by greenish coloured grubs, the largest of which were a little over an inch long, some being quite small. They ate through the skin and then consumed the inside. There were a number, a dozen or so, in each tomato. The plants are healthy and vigorous, the foliage not being affected. There are thirty or forty plants in the patch. Every one I examined was in the same condition. The grubs are not very active. As the matter may be of economical importance, I thought it would be well to let you know about it at once. It may, of course, be only a casual invasion ; but, should it spread and become general to the extent that this patch of mine is affected, it will prove a serious matter for tomato growers.

'Since writing the above I have learned from my man that there were a large number of these same grubs in a patch of oats and peas growing alongside of the tomatoes, and that on a nearby farm there were immense numbers in a field of peas. Some cauliflowers growing near my tomato plants are also being visited.'—W. O. EASTWOOD.

'July 30.—As requested I send you some of the grubs from my tomatoes. My man tells me that, upon pulling up some of the affected plants, he found bunches of the grubs an inch or more below the surface, also that they are thick in a field of peas about half a mile from here.'—W. O. E.

'Pefferlaw (York Co.), Ont., July 30.—I send you by mail a box of worms which are abundant on the farm of Mr. James Cornwall, of Georgina township. They have

stripped a field of carrots and mangels. They devour the leaves of Canada Thistle, gooseberries, choke-cherries, &c. A field of oats beside the carrots is untouched. About eighty rods away, on the farm of Mr. W. Jackson, they have devoured a field of peas. After eating the leaves of the mangels they attacked the roots and ate large holes in them. They can be dug out of the ground around the carrots and mangels in large numbers. Kindly tell me what they are and advise a remedy.'—THOMAS CORNER.

Like the Variegated Cutworm this is a double-brooded species and is never a rare insect ; but this year it was exceptionally abundant. It was the second brood, the larvæ of which are found in July, which was so destructive this year.

The following is a description of the full-grown larva of *Noctua c-nigrum*, the Spotted Cutworm.

Length, about one and three-quarters inches, by slightly less than a quarter of an inch in width. The markings of this caterpillar are in a general way very similar to those of *Peridroma saucia*, except that the mottlings are finer and less distinct, thus by contrast making the bands and stripes more prominent. The medio-dorsal line is continuous and not expanded into the yellow spots so characteristic of the Variegated Cutworm. The black velvety blotches of the sub-dorsal stripe are more clearly defined, and the posterior extremities do not meet on segment 12 in the black W-shaped blotch of *P. saucia.* The black blotches of this line are all separate and decrease in size anteriorly, and each one bears in front of it, lying towards the centre of the dorsum, a pale blotch, behind which in the centre of each segment is a smoky shield-shaped blotch. These markings give a much more checkered appearance to this caterpillar than is the case with the Variegated Cutworm. The sinuous band between the infra-stigmatal band and sub-dorsal stripe is also shadowed above with pale blotches. The ventral surface is conspicuously paler than the dorsal. This caterpillar as compared with the Variegated Cutworm is more slender, shorter, and the colour is, as a rule, ruddier, the mottlings much finer and the black marking more contrasted with the ground colour.

These caterpillars when full-grown burrow into the ground and form a cell in the same way as the Variegated Cutworm. The length of time from the hatching of the eggs until the caterpillar is full-grown is about six weeks in summer. The hibernating larvæ begin feeding in April and produce moths by the end of May or early in June. It has been noticed, however, by Dr. Forbes, in Illinois (Ill. Agr. Exp. Stn. Bull. 60) that a few are said to continue much longer in the pupal stage, even as late as August. This retardation of development is a common feature with many insects, of all orders, and is doubtless a provision of nature as a means towards the preservation of species.

The moth of the Spotted Cutworm, which, from the markings on the forewings, has been called the Black C Rustic, is a rather showy moth of about an inch and a half in expanse of wings. The forewings are, as a rule, purplish brown, sometimes almost black, in the females, and much paler in the males. There is a black C-like spot in the middle of the forewing, the open part towards the front edge of the wing, and filled with a much paler blotch, which extends beyond the C-like spot and merges with the general colour of the wing. There is great variation, however, in the shade and intensity of the colouring, specimens of both sexes being lighter or darker than the average. The hindwings are dusky, paler towards the base, and of a satiny lustre. The thorax is of the same colour as the forewings, with a distinct pale collar.

The remedies which are recommended for the Variegated Cutworm on a previous page will be found applicable to this species also.

There were but few parasites noticed among the caterpillars sent with the above letters, but upon one larva three curious egg-like bodies were observed, which proved to be the larvæ of a small hymenopterous parasite, which has been identified by Mr. W. H. Ashmead, of Washington, as *Euplectrus frontalis*, How. These parasitic larvæ were oval, like minute white eggs, at first, but later were attenuated posteriorly and about one-twelfth of an inch in length. They were attached to the back of the cater-

pillar, close to the head, and only relaxed their hold when full-grown, to spin their light silky cocoons among the leaves close to the dead body of the caterpillar, which they had destroyed.

THE CABBAGE PLUSIA
(Plusia brassicae, Riley).

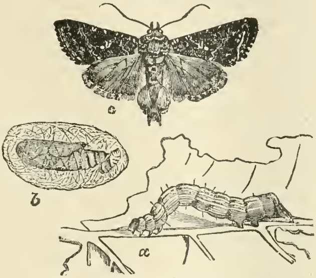


Fig. 15.—The Cabbage Plusia: *a*, caterpillar; *b*, cocoon; *c*, moth.
(Cut kindly lent by Dr. S. H. Forbes.)

This insect is frequently a serious enemy to the market gardener in the United States; but I have never received a complaint concerning its work in Canada until the present year. This has been a matter of some surprise to me, because it has been the cause of much loss in States of the Union close to our boundaries, both in the East and in Minnesota. In July last, specimens of the caterpillars were sent in from the North-west, and moths were taken at Ottawa and St. John, N.B., for the first time.

'Regina, Assa., July 18.—The caterpillars I send have been doing some damage in gardens here. I observed them first on potatoes about three weeks ago; they ate small round holes in the leaves. They have since turned their attention to lettuce. In my own garden they ate a row of green lettuce right to the ground before I found out what was the matter. They have since got into the bronze variety; but do not appear to devour it so voraciously as the other. I have found them in a neighbour's garden eating the leaves of celery much in the way they attack potatoes. The colour of the caterpillar is a bright, rather blue, shade of pea-green, somewhat whitish along the back. It is very lively, especially when small, and when disturbed rolls itself into a ball. Some of the caterpillars are now spinning their cocoons in the lettuce leaves. Please let me know what species it is, and what remedy to apply.'—J. R. C. Honeyman.

The Cabbage Plusia, also known as the Cabbage Moth, and, in the caterpillar form, as the Cabbage Looper, is said to be, where it occurs, the worst pest known on lettuces grown in forcing houses. It would appear as though this insect were becoming year by year a worse pest, and that the area where it occurs as an injurious insect is enlarging. It may be that before long we may, in Canada, have to reckon with this insect as a regularly recurring enemy.

The most practical means of preventing the work of the caterpillars on lettuces in forcing houses is stated to be the keeping of the ventilators closed with mosquito netting. It is thought that the eggs are sometimes laid on plants before they are taken into the houses, but probably the moths gain access to forcing houses more generally through the ventilators. There are many other plants in greenhouses which are attacked by this caterpillar. In the autumn they have been found troublesome among chrysanthemums, cutting off the flower buds. Smilax and other plants have also been injured. In the open ground the caterpillars are most destructive to cabbages and related plants, such as have smooth leaf surface. They feed on the surface of the

leaves, and are said by Mr. Sirrine to be much more particular about what they eat than is the case with the imported Cabbage Worm. They walk rapidly, and, if they find any foreign substance on the leaves, they move off to other parts of the plant.

The caterpillars are pale green, striped with longitudinal whitish lines. The body of these caterpillars is shaped differently from most of the common noctuid caterpillars found in gardens, in that it increases gradually from the head to the last segment, where it is largest and slopes off abruptly. Another noticeable difference between the caterpillars of the Plusias and other noctuid caterpillars, is the fact that they have only two pairs of prolegs instead of four. There are several species of these insects, but none have ever proved very troublesome in Canada. In 1884, the Cabbage Plusia was very destructive in the State of Minnesota, almost equalling the injuries of the common Cabbage Worm *(Pieris rapae,* L.). Dr. Forbes states (Ill. Agr. Exp. Stn. Bull. 60) that the larva feeds on celery, kale, turnip, tomato, lettuce, mignonette, dandelion, dock, clover, lamb's quarters, and some less common cultivated crops. It ranges through the United States and occurs also in Canada. The eggs are laid upon the food plants, singly or in small clusters The larva spins a gauzy cocoon among the leaves. The pupa is light yellowish brown in colour. The moths are very dark, the upper wings being almost black or very dark gray, marked with small white points and indistinct bands, and having a silvery U-shaped spot on the middle of the forewing, and a smaller round silvery dot close to it on the outside. There seem to be two broods of this insect in Canada.

It has proved to be a difficult matter to destroy the caterpillars of the Cabbage Plusia upon cabbage and lettuce crops. Mr. F. A. Stirrine (N.Y. Agr. Exp. Stn., Bull. 144) tried many experiments with remedies, and found that a soap wash containing arsenical poisons proved the most useful. He speaks of this as a resin-lime mixture and gives the best formula for its preparation. The estimated cost for preparing and applying this remedy is $2 an acre.

THE SAN JOSE SCALE
(*Aspidiotus perniciosus*, Comsk.).

This insect continues to receive the keenest attention from practical entomologists in all parts of North America, and most careful experiments have been carried out in the endeavour to find any treatment which will control the scale without injuring the tree. At the present time crude petroleum and whale-oil soaps (caustic potash fish-oil soaps) seem to give the greatest promise in this direction. With regard to crude petroleum, more experience seems to be necessary before a definite recommendation can be made as to the strength and manner in which it can be safely applied. Mr. George E. Fisher, the chief Inspector for San José Scale for the province of Ontario, has experimented extensively during the past summer with both of the above-mentioned materials, and the results of this work, which he presented in an important address before the Entomological Society of Ontario, at the annual meeting in November last, may be summarized as follows :—

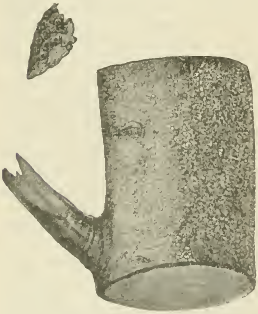


Fig. 16.—San José Scale; apple branch with scales ; large scales above at left.

Whale-oil soap, at a strength of two pounds to one gallon of warm water, killed many scales; but in no case was complete success obtained, however carefully the work might have been done. The trees, nevertheless, were in most cases benefited by the application. The scale was reduced to the

greatest degree on cherry trees, and aphids were quite destroyed. Even when trees were in blossom, no injury from the soap was noticed. The treating of trees with the whale-oil soap did not prevent the young scales from settling soon afterwards on the parts treated.

Crude petroleum gave better results as far as the scale was concerned. A mechanical mixture of water with 30 per cent crude petroleum could be used quite safely on apple trees, and also with care upon plum and peach trees ; even this, however, was not a perfect remedy, as all the trees treated had some scale upon them at the end of the season. Mr. Fisher considered that a combination of whale-oil soap and crude petroleum would probably be found the best remedy. He did not think it safe to recommend crude petroleum for general use. The ordinary fruit grower would not use even the whale-oil soap in accordance with instructions, and he felt sure they would use crude petroleum in the same careless way, and trees would be killed. He believes that a frequent cause of injury from crude petroleum when applied with water is that operators when spraying, go over trunks and other parts of trees twice ; beginning on the trunk, they go over the tree and finish up again on the trunk, thus depositing two applications or twice the necessary quantity of oil, because the water evaporates quickly but leaves the oil on the tree. Imperfect work is frequently done from the difficulty of reaching the upper side of the high branches on the opposite side of a tree which is being sprayed. The best time to apply the spray, whether of soap or of crude oil, is in April.

A word of warning may be here inserted for the benefit of those who may wish to use crude petroleum with regard to the variation in the specific gravity of crude petroleum from different wells. Dr. J. B. Smith, who has certainly done more to test the value of this remedy than anyone else, says (New Jersey Bulletin, 146), after giving the specific gravity of several samples :—

'Thus thirteen samples register 50° or over, leaving 70 that run between 40° and 49°, the majority running nearer to 46° than to 44°, both in green and in amber oils. It is a fair requirement, then, for a straight crude petroleum that it should have a specific gravity of 43° or over, at a temperature of 60° Fahr.; anything less might be harmful; anything more than 45° is unnecessary.

The importance is thus shown of knowing what the specific gravity by the Baumé oil scale is before any sample is used by a fruit-grower upon his trees.

The San José Scale exists in Canada only over a small area of the province of Ontario, extending from Niagara around the western end of Lake Ontario as far as Burlington and westward through the counties bordering on Lake Erie, and, even in that area, although it is true that the scale has increased considerably during 1900, the outside limits of this area have not been extended, and it is only in certain orchards where the insect occurs. In addition to this the majority of the owners of these orchards understand now the danger of neglecting to treat their trees, and are adopting vigorous measures to control the pest. The area may be described in general terms as that part of Ontario where the peach can be grown commercially. All reports of the occurrence of the San José Scale in other provinces are erroneous. The only other province where it has ever been found living on trees, is British Columbia ; this was some years ago, and Mr. R. M. Palmer, the official Inspector of Fruit Pests, expressly writes on this subject :—

'Victoria, B.C., November 21.—You will be glad to know that there is no San José Scale in the province. Reports of the presence of this dreaded pest from Salt Spring Island and Cowichan district, upon investigation, proved to be unfounded. The "scare" arose from the fact that many apples affected with the "leaf-spot-fungi" developed a red-spotted appearance somewhat like the discoloration of the fruit caused by San José Scale.'—R. M. Palmer.

An important step with regard to this insect was taken by the Hon. Minister of Agriculture last spring in putting through an amendment to the San José Scale Act, by which under certain restrictions nursery stock was allowed to be imported

into Canada from countries where the San José Scale was known to occur. When it was discovered that this insect could be killed on nursery stock by fumigating with hydrocyanic acid gas, at the urgent request of many fruit-growers, horticultural societies, nurserymen and others, by instruction of the Minister of Agriculture, proper fumigating houses were erected last spring at such points on the boundary as it was thought would be most convenient to importers, and qualified superintendents were appointed to treat any nursery stock, trees, shrubs or other plants as might be imported through these ports, and then repack and send them on to their destination as promptly as possible. For this fumigation with hydrocyanic acid gas the formula recommended by the United States Entomologist for dormant stock was adopted, it being the simplest effective formula, viz. : one fluid ounce of commercial sulphuric acid, one ounce of refined cyanide of potassium (98 per cent), and three fluid ounces of water to every 100 feet of cubic space—exposure 45 minutes. These fumigating houses were located at the customs ports of St. John, New Brunswick; St. John's, Quebec; Niagara Falls and Windsor, Ontario; Winnipeg, Manitoba; and Vancouver, British Columbia. The whole expense of these stations was assumed by the Dominion Government, but all shipments were made entirely at the risk of the shippers or consignees, the government assuming no risk whatever. The packages had to be addressed so as to enter Canada at one of the above named ports of entry, and the route by which they were to be shipped, clearly stated upon each package.

Many horticulturists and nurserymen availed themselves largely of this concession, and at every port much stock was imported from the United States and Japan. Nursery stock of all kinds can be imported from Europe without fumigation, as the San José Scale has never gained a foothold in European countries. Certain other plants which are not liable to the attack of the San José Scale are also exempted from treatment under the San José Scale Act. These are: (1.) green-house plants, including roses in leaf which have been propagated under glass; (2.) herbaceous perennials, including strawberry plants ; (3.) herbaceous bedding plants ; (4.) all conifers ; (5.) bulbs and tubers.

The fumigating houses were kept open with a superintendent constantly in attendance throughout the seasons of spring and autumn shipments of stock. Owing to the lateness of the season at which it was decided to do this work, the fumigating station for British Columbia was not operated until the autumn season of 1900, and, as all vegetation is much earlier in Oregon and Washington States, from which most shipments are made into British Columbia, it has been arranged that for that province the fumigating house shall be kept open for the winter months from October 15 till March 15. For Manitoba and the Eastern Provinces the spring season is from March 15 till May 15, and the autumn season from October 7 till December 7.

The San José Scale, although only occurring as stated above in a comparatively restricted area in the province of Ontario, has increased considerably in orchards which were infested last spring and other orchards adjacent to them. Nevertheless, the condition of orchards even in the area where trees are liable to become infested, is by no means hopeless. The Ontario Government has expert, capable and wise officials devoting their best energies to the discovery of a practical remedy ; and, although, from the lack of knowledge on the part of some fruit-growers, the work of controlling the San José Scale has been much hindered by the suspension of remedial measures in 1899, at the same time, the results of experiments show that much good can be done by treating orchards if this is done systematically. This treatment, however, in the present state of our knowledge, is both dangerous and rather expensive; but the former of these drawbacks will most probably be lessened or done away with by future experimenting, and the question of expense is merely a business matter of comparing outlay with returns, the same as has to be met in every branch of a fruit-grower's or any other business man's work. It is merely a question of whether the treatment pays or whether it does not. If it can be shown that a certain expenditure of money and labour will bring a profitable return, that is all the business man has to consider.

As an illustration of this, it will be worth the while of all fruit-growers living in that part of Ontario where the San José Scale occurs, to acquaint themselves with the actual facts of the present condition of Catawba Island, Ohio, in Lake Erie. A year or two ago this island was practically one large and very prosperous peach orchard. Later the San José Scale was imported and increased to the extent that the fruit prospects of the whole island were thought to be ruined. The natural excitement caused by this state of affairs stirred up the whole fruit-growing community to the adoption of energetic measures. By the advice of Prof. F. M. Webster, whale-oil soap was adopted as the universal remedy. Arrangements were made with Mr. W. H. Owen, of Catawba Island, to make a uniform grade of whale-oil soap, and this was applied to the trees throughout the island. As a consequence of this work, a large crop of fruit has been reaped from Catawba Island, where but for this concerted action only devastation and ruin could have existed. It must not be forgotten, however, that this action by the fruit-growers was almost universal, and nearly every orchard was sprayed regulary and at the time advised. Now, Prof. Webster expressly states that the San José Scale on Catawba Island is by no means exterminated, but that the fruit-growers have got it under control by a persistent use of whale-oil soap. They have simply reduced the pest to a point where it can be controlled ; but, just as sure as they give over their efforts for a single year, the insect will come to the front again, and, if two or three years were allowed to pass without treatment, a great many trees would be lost.

In one particular district in Ontario the fruit-growers protested strongly against the measures adopted by the Provincial Government to control the scale, but at the same time it was found afterwards that they had done nothing to treat their trees to prevent the scale from spreading. As a consequence, during the past season this district has become one of the very worst infested. There was at one time in the United States the same difficulty in persuading fruit-growers to treat their trees. Prof. Webster in his bulletin (No. 103, Ohio Agr. Exp. Station), 'The San José Scale Problem in Ohio, in 1898,' says: 'Heretofore it has sometimes been difficult to get the owners of some slightly infested orchards to apply whale-oil soap, but this season has taught them a lesson that they will not soon forget, for, while they stubbornly refused to treat their orchards last spring, they now have the rather humiliating spectacle of trees on their own premises almost if not quite totally devoid of fruit, while their more progressive neighbours, who invested their money in whale-oil soap and applied it faithfully, have plenty of fruit and no longer fear the San José Scale. Many orchards whose owners could hardly have been induced to treat their trees last season on suspicion of the San José Scale being present, will hereafter be treated on the slightest possible suspicion of the scale being present, and the owners will do it willingly.'

Prof. Lochhead, of Guelph, who has devoted much time and attention to the question of the San José Scale in Ontario, says, under date December 22, 1900 :

'This is the cloud which is hovering over the fruit-growers of south-western Ontario at the present moment. They recognize now that the scale has spread very widely during the past season, and has also increased in intensity. They know also now that no remedy need be applied in a slipshod fashion. To my knowledge the scale is spreading from new centres not previously known. The remedies are known, but it remains for the owners of orchards to follow the prescription closely which has been given by entomologists. The nurseries will be more closely watched than ever this coming year, so that no infested stock can possibly leave the grounds.'

It will be seen from the above precautionary measures, which are being strictly enforced by both the federal and the provincial governments, that every possible effort is being made in Canada to-day to control, if possible, this terrible pest, and to prevent by every means fresh introductions. Not only is every woody-stemmed plant imported into Canada from infested countries fumigated with hydrocyanic acid gas, but every nurseryman in Ontario is forced to submit to the same treatment every shrub and tree supplied to customers.

THE PALMER WORM

(*Ypsolophus pometellus*, Harr.).

Attack.—Slender greenish white caterpillars, reddish brown on back, with a central stripe down the middle, bordered on each side with white irregular bands ; when full-grown, a little over half an inch in length ; feeding on the leaves, and sometimes on the surface of the fruit.

Complaints of the work of this insect have been received from several localities during the past season, particularly from sections along the northern shore of Lake Ontario. It has also been found as far north as Ottawa. Judging from reports received, the Palmer Worm has confined its attacks chiefly to the apple. From a letter received from Mr. A. W. Peart, of Freeman, Ont., dated June 19, the following is extracted :—

'I enclose in small box some worms which are very plentiful here at present, working particularly on the apple. They vary in size from a ¼ of an inch to ⅝ of an inch in length. They are a light yellow with two stripes running lengthwise on either side of the back. Their most marked characteristic is their rapid motion. Take one in the palm of the hand, and touch it, it wriggles and jumps an inch or two with rapid lightning-like contortions. When you catch one, it is hard to hold. Like the cankerworm, it spins a thread when you disturb a branch, and lets itself down, and you can see it swinging ; but unlike the cankerworm, it does not loop in travelling. I find it in holes eaten in the young apples, and I think it is responsible for at least a portion of the cavity, if not all. On some trees, with their leaves badly riddled, you can find them by hundreds.'

Letters of a similar nature to the above have been received from Oakville, Adolphustown, and other points.

The life-history of the Palmer Worm is fairly well known. When the caterpillars are young they eat only the soft tissues of the leaves, but, as they mature, they devour the whole of the foliage, with the exception of the coarser veins. This is especially so when the larvæ are numerous. When the infestation is not of a serious nature, the caterpillars may be found feeding in a folded portion of a leaf. These larvæ are extremely active, and, as has been observed above, if a tree on which the caterpillars are at work is suddenly jarred, the larvæ will drop from their feeding places, and suspend themselves in the air by means of silken threads. If one is placed on any flat surface, it wriggles, and when touched moves with remarkable rapidity.

When full-grown, the caterpillar is a little over half an inch in length, and in general appearance is a greenish-white larva, with the dorsal area reddish brown, having a central dorsal stripe widely bordered on each side with white irregular bands, a little wider than the medio-dorsal stripe. The head is honey-yellow. The thoracic shield is transparent and inconspicuous, having the hind margin borderded with black for half its length, the black edge terminating with a hook forward on each side of the shield, leaving a wide central opening. The stigmatal fold is prominent. Along the dorsal area are two series of black piliferous spots, those on the anterior portion of each segment closer together than the others. Spiracles whitish, difficult to detect. The body bears a few slender bristles, one from each spot.

When mature the caterpillar changes to a chrysalis, usually in a fold of a leaf, and produces the moth in about fourteen or fifteen days. Those received on June 28 spun up on July 2, and the moths appeared on July 16 and 17. The moth is a delicate little creature of about five-eighths of an inch in expanse of wings. It is of a grayish-brown colour, with a purplish or golden reflexion ; some specimens are of a tawny yellow. The forewings are dotted with small dark chocolate-coloured spots. The margins of the dusky lower wings are deeply fringed.

Remedy.—The remedy for this insect is spraying with the arsenites. A hymenopterous parasite was bred from this species by Mr. C. H. Young, of Ottawa.

THE GREENHOUSE LEAF-TYER

(Phlyctaenia ferrugalis, Hbn.=*Botis harveyana*, Grt.).

Attack.—Slender semi-translucent green caterpillars, when full-grown, nearly an inch in length, with two distinct black spots (one on each side) close behind the head, the green dorsal vessel showing distinctly down the middle of the back, bordered on each side with a double white band ; feeding on the cellular tissue on the lower sides of the leaves. In many cases the leaves are drawn together by threads of fine silk.

In my last report the above insect was treated of at some length, and, as it is now still prevalent in the same locality (Toronto) and has appeared in other houses in Hamilton, I again draw special attention to it, for unless checked it is liable to spread and possibly become a serious greenhouse pest in Canada. In Toronto last year the larvæ did much harm, causing considerable loss to roses, but this year the species is also attacking violets and chrysanthemums. On November 12, Mr. Arthur Gibson, of this Division, paid a visit to the houses of Mr. J. H. Dunlop, Toronto, and specimens of the larvæ in all stages, pupæ and moths were found in some abundance. In one of the chrysanthemum houses especially, the insect was very prevalent and numbers of the moths were flying at the date mentioned. In this house some eggs were found, and these have since hatched in the office and proved to be the same species.* The eggs were laid on the under side of the leaves. They are flattened and remarkably like those of the Codling Moth, dirty-whitish, about one-half mm. in width, round, strikingly iridescent, the surface coarsely reticulated (which gives them a slightly roughened appearance), and are laid sometimes singly, in pairs, or in clusters of 3 to 7, the eggs of which overlap at the edges. The work of the caterpillars was only noticed on the underside of the leaves, and in the case of the mature larvæ large pieces of the soft tissue were eaten away. The caterpillars were generally found to be within a slight silken web, and in many cases two leaves were brought together and fastened by threads of silk, the larva feeding on the soft tissues on the underside of the upper leaf. The young caterpillar, as soon as it hatches from the egg, is about one-twelfth of an inch in length, and of a semi-translucent creamy-white colour, with a large black head. The body bears slender whitish hairs, and the skin is smooth and shining. After they have been feeding, the colour of the green food contents gives the caterpillars a slight greenish appearance. In the second larval stage, pale whitish stripes are present on the body, and these, as the larva passes through its other stages, become more distinct. When mature the caterpillars are about three-quarters of an inch in length, slender, semi-translucent, with the dark-green dorsal vessel showing distinctly through the skin, but rather faint on segments 2, 3 and 13. On each side is a double white sub-dorsal band which is also rather faint on segments 2, 3 and 13. On segment 2 are two distinct black spots, one on each side of the dorsal area. Head about one twenty-fifth of an inch in width, bilobed, smooth, shining, whitish, splashed with brownish blotches on cheeks and bearing a few pale hairs. Mouth parts brownish; ocelli black. Spiracles white and very small, joined by a faint whitish line. On segments 2, 3 and 4 this line is represented by a few faint white dots and is obsolete on segment 13. Thoracic feet and prolegs of the same colour as the body ; the thoracic feet each bear exteriorly two black dots, one above the other. The whole body is sparsely covered with slender pale hairs, the ventral surface being lighter in colour than the dorsal. When at rest these caterpillars have a habit of curling round to the side of the body their heads and the first three or four segments. The duration of the pupal stage is from seventeen to twenty days. The moth is of a rusty-brown colour, and when the wings are spread measures a little over five-eighths of an inch in width. When at rest it measures three-eighths of an inch at widest part. The wings are crossed with darker lines and also bear darker markings.

As to remedial treatment, the picking of the leaves on which the caterpillars are at work is recommended, and in the Toronto houses good work in this direction has

* Many eggs have since been secured from moths kept in confinement.

been done; large numbers of the moths have also been dislodged from their resting places and killed. The proper carrying out of such work, however, takes up too much time, especially if many large houses have to be gone over, and, as this insect is almost continuously at work when once established, no doubt fumigation with hydrocyanic acid gas is the quickest and most effective remedy.

A GREENHOUSE LEAF-ROLLER
(*Cacoecia parallela*, Rob.).

Attack.—Dull green caterpillars about an inch in length when full-grown, with yellowish-brown head and thoracic shield ; each segment but the first two bearing conspicuous white piliferous tubercles ; feeding on the foliage of rose bushes in greenhouses, drawing the leaflets together by threads of silk, or rolling a leaf up and spinning a web inside.

In my last report I recorded the occurrence of two new greenhouse pests in Canada, viz., the Greenhouse Leaf-tyer *(Phlyctaenia ferrugalis,* Hbn.), and the Black Violet Aphis *(Rhopalosiphum violae,* Perg.*)*, both of which occurred at Toronto. During the past year there was brought under my notice for the first time in Canada the work of another insect, attacking the foliage of rose bushes in greenhouses of Messrs. Webster Bros., at Hamilton, Ont. Specimens of the caterpillar were sent to the Division, and these have since been bred to maturity, and proved to be those of a small tortricid moth, *Cacoecia parallela,* Rob., somewhat resembling the Oblique-banded Leaf-roller, which has long been known to injure roses, particularly out of doors.

The caterpillars of *Cacoecia parallela,* Rob., were first noticed doing injury at Hamilton in June, 1899, and since then they have appeared in hundreds, causing great annoyance and damage. The larvæ were particularly prevalent during the present year, from the end of March until about the middle of October. The work of the caterpillar is much after the style of both the Greenhouse Leaf-tyer and the Oblique-banded Leaf-roller. It feeds on the green foliage and has the habit of drawing the leaflets together by means of threads of silk, or rolling a leaf over, spinning a web and feeding inside.

The caterpillar when full-grown is about one inch long ; it tapers slightly to each end and has the segments distinctly marked. The colour is dull green, overlaid lightly with velvety black, of a slightly darker shade on the dorsum. The piliferous tubercles are white and conspicuous, bristles long and slightly wavy. The head is round, slightly depressed in front, of a yellowish-brown colour, and bears some slender light hairs ; mouth parts and antennæ darkened; ocelli black. Behind each cheek, at the back of the head, is a black elongated blotch in line with the ocelli. Thoracic shield honey coloured, with two small back spots on the front margin, divided by the pale median line. The posterior margin of the shield is bordered heavily with black, which gradually enlarges into a wide blotch towards the apex. Like the double blotch on the front margin, these blotches are separated by the median line. Below the thoracic shield are two short tubercle-like chitinous dashes, the upper of which is immediately in front of the spiracle. Each of these dashes bears a pair of bristles. The anal shield is darkened towards the apex and bears several slender bristles. The conspicuous white piliferous tubercles are arranged as follows :—The sub-dorsal tubercles are widely separated, so as to bring them and those of the lateral series almost into line. The supra-stigmatal tubercles are immediately above and close to the small black-ringed spiracles, in some cases partially inclosing them. The infra-stigmatal tubercles are directly below the spiracles, and separated from them by twice their width. The supra-ventral tubercles lie in a line directly below those of the lateral series. There is a ventral series of large double tubercles which lie at the base of the prolegs and thoracic feet, and each of which bears two or three bristles. On segments

5, 6, 11, 12 and 13, there is beneath each segment a series of small ventral tubercles on each side of the medio-ventral line. The thoracic feet are shiny, black, white at joints, and almost ringed at the base with a narrow shiny black band, which is open on the outer side. The prolegs are concolorous with the ventral surface. All the feet bear short hairs.

When full-grown the caterpillars spin light cocoons among the leaves, two or three of which they gather together. The pupal period of specimens bred during the past season was about nine or ten days.

The moth, which, in a superficial way, closely resembles the well known Oblique-banded Leaf-roller, measures from three-quarters of an inch to very nearly an inch in expanse of wings, and in greenhouses there are several broods in the season. The colour of the upper wings is a pale brown, crossed obliquely by three bands of a much darker shade, the central one of which is clearly defined at its margins. The other two bands fill up the apical and basal areas of the wings. In many specimens the basal band is almost obliterated. The whole wing surface is loosely reticulated with indistinct basal lines. Under wings paler than the upper.

Fig. 17.—*Cacœcia parallela.* (After Prof. O. Lugger.)

Although rather smaller, this moth resembles the Oblique-banded Leaf-roller very much in general appearance, but it will be seen by the above description of the larva that these two insects are very different indeed in the caterpillar stage of their existence. The larva of the Oblique-banded Leaf-roller may in general terms be described as a green larva with a very dark brown, almost black, head, while that of the above is a blackish green caterpillar, with a yellowish head, and having the body conspicuously dotted with white tubercles.

Owing to their habits, the caterpillars are rather difficult to reach with remedies. Spraying with Paris green and water was tried to a limited extent, but it was not thought to have a sufficiently beneficial effect to continue the applications. This failure, it was claimed, was due to the way in which the caterpillars protect themselves. There is no doubt, however, that many of the larvæ were destroyed, and doubtless more would have been killed if the spraying had been continued longer at short intervals. In the above houses only two applications of Paris green were made, and as this did not appear to have good results, the caterpillars were left to themselves, and no further treatment was applied to the foliage. Late in the season (September) the moths were very numerous, and hand-picking of the larvæ was resorted to, a good sharp boy being sent through the houses early every morning to pick the caterpillars from the bushes. All the larvæ obtained in this way were burned.

Remedies.—As regards remedial treatment, of course, hand-picking of the caterpillars has certainly some beneficial result ; but, as I have pointed out in the case of the Greenhouse Leaf-tyer, the carrying out of such work carefully and properly, takes up too much time, especially if large houses have to be gone over. If the infestation is light, hand-picking will probably be all that is necessary, but when the insect is at all abundant in large houses, spraying or dusting with poisonous mixtures or fumigation with hydrocyanic acid gas are the most effective remedies. Fumigation with this gas, however, must be done carefully and strictly according to instructions, and if such treatment is adopted by any one to destroy greenhouse insects, unless they are fully posted on the matter, communication should previously be entered into with this Division, when full information will be cheerfully given. Hydrocyanic acid gas is now largely used to destroy greenhouse insect pests, but its very dangerous nature must not be overlooked.

SOME INSECTS OF SPECIAL INTEREST REPORTED TO THE DIVISION OF ENTOMOLOGY DURING 1900.

(Detailed Treatment of which in the Present Report is Precluded by Want of Space.)

FODDER CROPS.

THE CLOVER ROOT-BORER (*Hylastinus obscurus*, Marsh,=*Hylesinus trifolii*, Mueller).—Reported at a few places in Ontario. The worst occurrences in old clover fields at London, Picton and in a small patch at Ottawa. Remedies : A short rotation and the ploughing down of infested fields as soon as there is a pretty good growth after the hay has been cut.

THE LARGE CLOVER WEEVIL (*Phytonomus punctatus*, Fab.).—Larvæ found at Picton, Ont., on May 24, in large numbers, but so severely attacked by the parasitic fungus *Entomophthora phytonomi*, Arthur, that little injury was done.

THE GREEN CLOVER WEEVIL (*Phytonomus nigrirostris*, Fab.).—Occurring with the last named at Picton and also abundant in clover fields at Ottawa. Remedy : Early cutting. The larvæ feed chiefly in the sheathing bases of the leaves and in the flower heads.

ROOTS AND VEGETABLES.

CABBAGE WORMS (*Pieris rapae*, L.).—This common enemy of the market gardener was particularly abundant in all parts of Canada this year. Reported as abundant and destructive at Kaslo, B.C., by Mr. J. W. Cockle, who observed it first in British Columbia last year. For the first time this year it appeared on Vancouver Island, and did much harm to cabbages and mignonette in gardens (J. R. Anderson, R. M. Palmer and G. A. Knight). In Ontario it was destructively numerous in the counties north of Lake Ontario, injuring the turnip crop seriously ; also reported as one of the worst pests in Nova Scotia (Harvie Gray) and parts of Quebec.

Remedy : Dusting with Pyrethrum and lime (or some other dry diluent), and spraying with arsenical poisons in turnip fields.

ROOT MAGGOTS (*Anthomyia*) of Cabbages, Cauliflowers, Radishes and Onions.—Many experiments were tried with more or less success. On cauliflowers and cabbages the best results were secured by using the Gough tar-paper discs which have been reported upon previously. For the other crops, carbolized mixtures seem to be of greatest promise.

These insects are reported to have been unusually scarce at Nappan, in Nova Scotia, this season, and as a consequence good cabbages and cauliflowers were grown (W. S. Blair). At other points in Nova Scotia (K. McIntosh), New Brunswick and Prince Edward Island (Father Burke), they were as destructive as usual.

CABBAGE PIONEA (*Pionea rimosalis*, Gn.).—Destructive in turnip fields in Prince Edward Island (S. A. Stewart and G. F. McKinnon).

TURNIP APHIS (*Aphis brassicae*, L.).—A considerable amount of harm has been done by the Turnip Aphis in a few localities, but the complaints this season have been far less numerous than has usually been the case. The worst attacks have been in the counties of Huron and Bruce, where in some sections as much as half the crop of turnips was destroyed (H. Deacon).

Remedies : Spraying with kerosene emulsion or whale-oil soap solution, 1 pound in 6 gallons of water, at the time colonies first appear in August ; also ploughing down deeply the tops as soon as cut from the roots, as the eggs were found to be laid upon these in large quantities at Belgrave, Ont.

DIAMOND-BACK MOTH (*Plutella cruciferarum*, Zell.)—Very destructive in parts of Vancouver Island (G. A. Knight) and Saskatchewan (Percy B. Gregson).

FRUITS.

Codling Moth (*Carpocapsa pomonella*, L.).—This is still a cause of enormous loss to fruit-growers. Where systematic spraying is practised, supplemented by the banding of trees with strips of burlap or whisps of straw, the numbers have been reduced to a marked degree. Many practical fruit-growers might be cited from every province of the Dominion to prove this.

Plum Curculio in Apples (*Conotrachelus nenuphar*, Herbst).—For several years this insect has been a troublesome pest in the orchard of Mr. Jack, at Chateauguay Basin, Que. In the fall of 1899 the orchard was ploughed and the land has been cultivated most of the past summer, and, as a result, no injury has been done by the curculio, except where some raspberries were left growing among the trees.

Oyster-shell Bark-louse (*Mytilaspis pomorum*, Bouché).—There is probably no orchard pest in Canada which is wider spread than this and which has destroyed more trees. A practical remedy has long been a desideratum. The standard remedy, up to the present time, has been the kerosene emulsion ; but this has never been popular, owing chiefly, I think, to the trouble of making it and its destructive effects on rubber hoses. About five years ago it was noticed that trees sprayed with Bordeaux mixture were freer from this insect than those which had not been sprayed. This was due, it was thought, to the deposit of lime from that mixture which was left on the trees.

In the course of some experiments made on apple trees which happened to be badly infested with Oyster-shell Bark-louse on the Experimental Farm by Mr. W. T. Macoun, by spraying with a lime whitewash to retard the opening of flower-buds as a protection against late frosts, it was discovered that these whitewashed trees were very much cleared of the Oyster-shell Bark-louse, and subsequent experiment shows that this is probably an easy, cheap and effective remedy against this pernicious insect. The best time to apply the whitewash is late in the autumn, so that the scales loosened by the wash may be scaled off with the lime during the winter. Spraying trees during the winter is a very unpleasant operation, so this work should be done during the warm days of November, and the strength of the whitewash which has been found effective is from one to two pounds of lime in each gallon of water. A better coating of lime is deposited on the trees if two applications are made, the second being applied as soon as the first one is thoroughly dry.

Applications of concentrated lye, as supplied in tins for household uses, were also experimented with in varying strengths from 1 pound in 3 gallons of water, up to 1 pound in 6 gallons ; but they were not sufficiently fatal to the scale insects to justify their recommendation. Even at the strength of 1 pound in 3 gallons, although the leaves of some plants were spotted, no permanent injury was done. All the samples of concentrated lye which were obtainable were found to be caustic soda.

The Pear-tree Flea-louse (*Psylla piricola*, Foerster).—This insect is widely spread through the pear orchards of western Ontario, but seldom occurs in large enough numbers to attract attention. It is, however, a pest which pear-growers should watch carefully, and treat promptly if the numbers increase. Mr. George E. Fisher, a most accurate observer, with exceptional opportunities of examining orchards, writes : 'On several occasions I have noticed Pear Psylla doing very serious damage to pear orchards. When once established it multiplies very rapidly. Here at home a number of years ago I had 300 Dwarf Duchess trees badly infested, and even now, after spraying regularly, they do not seem to have fully recovered. My neighbour, Mr. J. S. Freeman, had a block of 400 Dwarf Duchesses so badly attacked that nearly all died. In 1899, Mr. E. J. Henry, of Winona, had an orchard badly affected. I am fully persuaded that this is not an insect to trifle with, but I do not dread it as much as I did, for I now know that by the use of an emulsion of crude petroleum and whale-oil soap I can destroy such insects as winter exposed on the trees. For Psylla one must

operate early, because the eggs are laid early. In May, 1899, I visited a large Dwarf Duchess orchard belonging to Mr. Henry Lutz, of Youngstown, New York State. In 1896 this block of trees had been almost ruined by Psylla. In February, 1897, the whole block was sprayed heavily with lime, which destroyed the insect so completely that when I saw the trees two years after they appeared very healthy indeed.'

THE RED-HUMPED APPLE-TREE CATERPILLAR (*Oedemasia coneinna*, S. & A.).—Specimens of these caterpillars were sent from Kaslo, B.C., by Mr. J. W. Cockle. They were very prevalent at the time in apple orchards.

THE PEAR-LEAF BLISTER MITE (*Phytoptus pyri*, Sheuten).—Several inquiries about this have been received from British Columbia. Mr. Palmer reports : 'This insect continues to be a very persistent pest, and is quite generally distributed through the province. It is easily kept down by the use of the lime, salt and sulphur spray used in winter, but is difficult to exterminate and will reappear if spraying is neglected.'

THE BLACK VINE WEEVIL (*Otiorhynchus sulcatus*, Fab.).—Occasional references to injuries by this beetle have been made, chiefly to garden plants and in greenhouses in British Columbia. The beetle is not uncommon on the sea shore in Nova Scotia, but no injury to crops of any kind has ever been reported from that province until the past season, when specimens and an account of serious injury were received from Mr. J. H. Churchill, of Westport, N.S. Strawberry beds have been injured for many years, and among the samples received were several plants which were attacked, not only by the Black Vine Weevil, but also badly by the Strawberry Root-borer (*Anarsia lineatella*, Zeller), fortunately an uncommon enemy in Canada. This injury has been going on for about six years, during which time Mr. Churchill estimates his loss in strawberries at $1,500. In British Columbia, Mr. Tom Wilson, of Vancouver, observed another occurrence of the Black Vine Weevil, where considerable injury was done to strawberry plants and primroses. In Europe this beetle is known to be a troublesome pest of grapes, strawberries, raspberries, mangels and primroses, but up to the present time nothing of importance has been recorded against it on this continent. The strawberry plants sent by Mr. Churchill from Nova Scotia on July 8, contained grubs and pupæ of the beetles, and in another parcel received on September 19, there were grubs, pupæ, and beetles, some of the latter being immature, but a few perfectly coloured. The only remedy which can be suggested for this beetle as yet is the planting of strawberries in new ground, and frequent renewal of the beds, the worst injuries being done to old plants.

In this connection I may add that Mr. W. T. Macoun, the Horticulturist of the Central Experimental Farm, tells me that he considers the single crop method of growing strawberries the one which pays best, the fruit being finer and the land being kept clean much more easily. Some varieties which do not make runners freely should be left for two years.

Nepticula (*Micropteryx*) *pomivorella*, Pack.—This interesting little insect has been more than usually abundant in western Ontario during the last two years, and a large series of specimens have been reared. The larva is a leaf miner, but when full grown, leaves the mines and spins small cocoons on the twigs of apple trees, in which it passes the winter. It has been lately discovered by Mr. A. Busck, of Washington, that this insect, which was described as a *Micropteryx*, is a true *Nepticula*.

The LESSER APPLE WORM (*Semasia prunivora*, Walsh).—Mr. R. M. Palmer reports that this insect occurred in nearly all the fruit-growing districts of British Columbia excepting the Okanagan valley, but in smaller numbers than in 1898-9. He draws attention to the fact that this pest is still often mistaken for the true Codling Moth, by fruit-growers, but he is pleased to report that the latter has not occurred in any part of the province, although watched for carefully. A most rigorous inspec-

tion is maintained of all fruit coming into the province, so as to prevent its introduction by that means.

The Apple Fruit Miner (*Argyresthia conjugella*, Zell.) appeared in small numbers on Vancouver Island during July, but no instance of its presence in large numbers was reported.

The Mealy Plum Aphis (*Hyalopterus pruni*, Fab.) was very prevalent in many parts of British Columbia. Spraying with whale-oil soap and quassia proved an efficient remedy.

The Mediterranean Flour Moth (*Ephestia kuehniella*, Zell.).—A mill badly infested with this insect, near Ottawa, was fumigated with sulphur with satisfactory results. An interesting observation was that the larvæ were largely parasitized by a small hymenopterous insect, which has been found by Mr. W. H. Ashmead to be a new species, and has been named by him *Idechthis ephestiae*.

The Red Turnip Beetle (*Entomoscelis adonidis*, Fab.).—This native beetle, which is bright red with three black stripes down its back and a spot on the collar, and is $\frac{3}{8}$-inch long by $\frac{1}{4}$-inch wide, was very abundant in the North-west Territories and parts of Manitoba last year. Several inquiries were received concerning its habits, and it was observed almost everywhere during July, chiefly upon cruciferous weeds, but also on turnips, radishes, &c. Upon a piece of neglected summer-fallow at Kinistino, Sask., it was seen in thousands upon the steeple-like plants of the Gray Tansy Mustard (*Sisymbrium incisum*, Engl., var. *Hartwegianum*, Watson) and upon *Erysimum parviflorum*, Nutt., and *Erysimum asperum*, DC., a near relative of the garden wallflower. This insect has been treated of at length in my report for 1892.

'Strathcona, Alta., June 1.—I send you some beetles which are abundant, climbing up the stems of some weeds on about half an acre of timothy ; they come out of the ground, which I dug up and found the holes about $\frac{1}{2}$ to $\frac{3}{4}$-inch deep. Are they likely to hurt the timothy ? I have seen them before, but not so plentiful as now.'—Thomas Daly.

'Strathcona, June 12.—I send a sample of a beetle which has been doing great damage in my garden, attacking wallflowers and stocks, all young plants ; they are now on my turnips, radishes and cabbage. I have killed probably 1,000. What are they called, and what is the best remedy ?'—John H. Wilson.

'Souris, Man., September 13.—I am sending an insect which is doing much damage in gardens in the Souris district, especially at this time.'—Robt. I. Crisp.

This beetle, both as a grub and in the perfect state, attacks all cruciferous plants. The best remedy is to spray or dust the plants attacked with arsenical poisons in the same way as for the Colorado Potato Beetle. The grubs are nocturnal in their habits, and are seldom seen.

This is also a European insect, but there is hardly a doubt that it is a native species in the North-west. In certain seasons it is very abundant, and may at any time develop into a serious enemy of the agriculturist. It belongs to the Chrysomelidæ, the family to which also the Colorado Potato Beetle belongs.

The Asparagus Beetle (*Crioceris asparagi*, L.).—The Asparagus Beetles, treated at some length in my last report, have occurred again in the Niagara district during the past season, but do not seem to have been the cause of much injury. However, their attacks have been supplemented by another enemy, the Asparagus Rust (*Puccinia asparagi*, DC.), and one of the Hemiptera (*Cosmopepla carnifex*, Fab.) was found upon asparagus by Mr. Frank Arnold, at Queenston, Ont. These clustered on the plants in very large numbers during the last week of July. No special injury was noticed at that late date, and it was not thought worth while to advise any remedial treatment. Spraying with either kerosene emulsion or whale-oil soap would doubtless destroy them, should they at any time prove troublesome.

The SQUASH BUG *(Anasa tristis,* DeG.).—This troublesome enemy of the gourd family is a regular pest in western Ontario, but is seldom heard of in the eastern counties. In the last week of June specimens were sent from Inverary (Frontenac Co.), Ont., by Mr. Alex. Ritchie, with the complaint that they were destroying his squash, pumpkin and cucumber vines. The remedies recommended for this insect are :—

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Fig. 18.—Squash Bug.

1. Hand-picking, which is claimed to be the most practical remedy. This is done early in the morning, during the cooler hours of the day, while the bugs are sluggish.

2. Traps. If shingles or short pieces of board are placed among the plants, the bugs will hide beneath them at night, and can be destroyed before they become active and leave these retreats the next morning.

3. The young bugs can be destroyed by spraying with kerosene emulsion or whale-oil soap.

ARMY WORMS IN WINTER.—A rather curious occurrence of the Army Worm in winter took place at Alberton, in Prince Edward Island, last February. This was reported to me by my esteemed correspondent, the Rev. Father Burke, of Alberton, who also sent specimens for identification from the farm of Mr. John T. Weeks, of the same place. The occurrence is described by Mr. Weeks, as follows :—

'Alberton, P.E.I., February 17.—I am in receipt of your letter of 8th instant, and am surprised to know that we have such a pest in our midst. The specimens I sent were supplied by my brother. He is going to try and get you some more specimens, and if he is successful he will forward them in the way you suggest. He says he saw them as he drove across several farms, and they were quite a long distance from bare ground.'—J. T. W.

'February 19.—This morning my brother came in with some more of the army worms. I am sending them in a tin box with some moist earth and some grass. These are much larger than the first I sent, but among the lot are several very small ones, which are apparently dead ; but I send them so that you may see the different stages of development. My brother tells me he saw them on at least half a dozen farms, and would have had no difficulty in picking up a hundred. We had an easterly snow-storm all day yesterday, which will probably cover them up again. I fear they seem to be pretty well distributed. To what extent are they known in Canada ? What is the remedy ?'—JOHN T. WEEKS.

In reply to these letters it was explained that the Army Worm passed the winter partially grown, in a torpid condition, near the surface of the ground, and that there were previous instances where they had appeared suddenly on the surface of snow during winter. It was suggested that this appearance in winter might prove beneficial, because many thus disturbed in winter perished. The distribution of the species in Canada was given and reports of this Division were sent, in which the usual remedies are stated.

In a report on the insect injuries of the year, Father Burke informs me that no injury whatever by the Army Worm was noticed during the past season.

THE BLACK BLISTER BEETLE *(Epicauta Pennsylvanica,* DeG.).—Injuries to potatoes by the Black Blister Beetle are reported from Dugald, Man., by Mr. Kenneth McLeod, from different parts of Ontario by Mr. C. W. Nash, of Toronto, and from Inverary, Ont., by Mr. W. T. McClement, who had also found them on the farm of Mr. John Guthrie, of Perth Road (Frontenac Co.) Ont., where, he says, they ate the tops of potatoes very cleanly, and were very active. If plentiful in a district, they would be worse than the Colorado beetle, for they are much more active. They flew ahead of the poison-can and ate the tops which were not poisoned, avoiding those dusted or sprinkled, and clustered thickly on the clean tops. They were plentiful about July 25. They were not widespread, but troubled only a few fields, and these near together.

The habits of Blister Beetles were explained to these correspondents, and also the connection of these insects with various species of locusts, upon the eggs of which the larvæ are predaceous parasites.

Specimens of an allied western species, *Cantharis cyanipennis*, Say, were also sent from Ducks, B.C., by Mr. Hewitt Bostock, who had found them injuring peavines in his orchard.

THE APIARY.

As in previous years, the sole management of the Apiary has been in the hands of Mr. John Fixter, the Farm Foreman. The season of 1900 has been a particularly poor one in the greater part of Ontario, but by the exercise of care and attention the colonies were housed in good condition, and as far as can be judged at this date are wintering well. Several meetings of bee-keepers were attended by Mr. Fixter, and addresses were delivered by him on practical apiculture, which were highly appreciated by his hearers. I myself had the pleasure of attending the annual meeting of the Ontario Bee-keepers' Association, at Niagara Falls, Ont., on December 5 and 6, and by request gave an address upon the Fertilization of Flowers by Bees. There was an interesting discussion upon the question whether bees could injure ripe fruit before the skin was broken ; careful experiments were cited showing that this was not the case, though bees will sometimes take advantage of a crack in the fruit or of an opening made by wasps or other insects, and will suck the juice.

REPORT OF MR. JOHN FIXTER.

Experiment in Feeding Sugar Syrup for Winter Stores.

During the winter of 1899, and the spring of 1900, great trouble was experienced with dysentery among bees in many parts of the country. The disease was thought to be due to food or honeydew gathered in the autumn. An experiment was started last autumn with four colonies. All the natural stores were extracted on September 17. A Miller feeder was placed in an empty section super, close to the top of the brood frames, any part of the brood frames not covered by the feeder being covered with a propolis quilt cut so as to allow the bees a passage through it or on its side. By keeping the feeder well packed, except where the bees enter, the heat is kept in and at the same time the bees cannot daub themselves with the liquid. In this experiment the bees had a constant supply of syrup. This syrup was made of the best granulated sugar, two parts to one part of water by weight. The water was first brought to a boil, then the boiler was set back on the stove and, the sugar having been poured in, the mixture was stirred until the sugar was all dissolved. This syrup was supplied to the bees at about blood heat.

At the beginning of the feeding the average weight of the hives and colonies was 33½ pounds, and at the close 52½ pounds. It required 80 pounds of sugar to make up the weight of the four colonies to carry them through the winter and spring successfully. The weight of water used to make the syrup should not be taken into account, as it is afterwards all evaporated during the winter.

Experiments in Wintering, 1899-1900.

Experiments in wintering bees were continued in the cellar, in a root-house, in the house apiary and in a pit dug in a hill side. The results were very much the same as those described in the report for 1898 (at page 213).

THE SEASON OF 1900.

March 10.—The temperature being 41° Fahr., and the day bright and calm, eighteen colonies were removed from their winter quarters ; of these six were again placed in the exposed apiary, when there was about 18 inches of snow on the ground; six were placed in the sheltered apiary, where there was also considerable snow ; and six were placed in the house apiary. As soon as they were settled on their stands, the bees all began to fly at once, the weather being fair and calm. They were thus enabled to cleanse themselves and return ; the snow was discoloured for a considerable distance around the hives. Very few bees were noticed which were unable to return.

March 31 and April 1 being fine and warm, the colonies of all three apiaries had good cleansing flights. From April 2 to 6 there was very little flying, the weather being cool and windy. On April 7 the bees in the house apiary and in the sheltered apiary were flying well, while those in the exposed apiary could scarcely be seen to move out.

The balance of the colonies were taken from their winter quarters on April 8, the temperature being 44°. The weather was too cold for the bees to come out to have a cleansing flight until April 11, when the temperature rose to 54°, and all began to fly. The colonies first set out were flying as well as is usual in the month of May.

From April 11 to 18, there was very little flying, on account of cool winds and wet weather.

On April 18 an examination was made of the colonies set out early in the different apiaries, and of those set out later, that is, at the usual time; the purpose being to find out whether any difference could be seen as to the strength of the colonies. In every instance, we found that those set out first, more especially those in the house and sheltered apiaries, had more brood and eggs, and appeared to be very much more active than those set out later. When once they get a good cleansing flight, whether through activity or from getting water, whatever may be the cause, more brood and eggs are found in the hives. I would advise setting the bees out just as soon as they can fly out safely. The colonies which are set out a few days earlier will be by so many days further advanced at the beginning of the honey flow, that is, those set out later will require so many days more to become as strong after the beginning of the honey flow.

On April 18 the temperature went up to 69°. The snowdrops and squills blossomed, and the bees were seen to work on them at once. On April 20 and 21, the swamp willow, soft maple and Manitoba maple came into bloom. This time would have been too late for the removal of the bees from their winter quarters, for they would before this have become restless ; many would have left their hives and been lost on the cellar floor.

From April 19 to 25 the bees were seen gathering pollen or sap running from the trunks of hard maple trees that had been injured.

April 26.—Very high wind, increasing to a hurricane in the afternoon—the day of the big Hull and Ottawa fire.

April 27 to May 7.—Weather very fine ; all colonies working well, gathering pollen and honey. Every colony was building up rapidly.

At this time, and also from the blossoming of fruit trees to that of clover, the greatest care is necessary, so that there may be no check in brood rearing. When the queen stops laying, or when starved brood or dead larvæ are observed in the hives, many beginners, and even many experienced men, imagine that the cause is some disease, and at once send for the Inspector of Foul Brood. An instance of this is given on a later page (Appendix A), with the answer of the Inspector of Foul Brood (*see* page 247).

May 8-10.—Very cold winds ; scarcely any flying.

May 11-16.—Very fine weather ; bees working well.

May 17 and 18.—Very dull and cold ; scarcely any flying.

May 19 to June 7.—The bees gathered a great amount of pollen, but very little new honey ; nearly every hive was full of brood and young bees.

The first drones were noticed on May 28. A considerable amount of honey and syrup was fed from May 1 to June 8 in order to keep up brood-rearing and to prevent starving.

On June 7 and 8, White Dutch Clover and Alsike came into bloom, and there were many flowering trees and shrubs in bloom, but there was very little increase in honey.

June 8 to July 15, the bees gathered a small amount of honey from clovers and basswood.

On July 15 the first honey was taken off ; bees were very thick on flowers ; but there was very slight increase in weight of hives during the latter half of July.

After August 3, the bees gathered very little honey, and there was no increase in weight of the hives. The autumn flowers gave no surplus, and, there being no buckwheat sown in this district in 1900, no honey was gathered from that source.

September 1 to 10.—All colonies and hives were weighed in order to ascertain how much they had lost or gained. They were weighed again on October 1 and on November 12, just before they were put into their winter quarters. Any colony and hive found to weigh less than 50 pounds on September 1 was either given full frames of sealed honey or fed syrup to make up the difference in weight. While our experiments show that each colony consumes only from 9 to 14 pounds during the winter, it is a very wise policy to have 10 or 15 pounds extra in each hive to be used in spring before the honey flow.

Average weight of forty colonies and hives :

On October 1, 51¾ pounds.
On November 12, 49 pounds.

The forty colonies had therefore lost altogether 110 pounds. The greatest loss of any colony was 4½ pounds, the smallest ½ pound.

All were put into winter quarters on November 12.

LIST of Plants, Trees and Shrubs on which the bees were seen working well during the summer, and dates at which the visits were first noticed.

April 18—Snowdrops and squills.
" 20—Manitoba maple and soft maple.
" 21—Willows in swamps and on lawns.
May 10—Tulips.
" 11—Plum and apple trees.
" 12—Dandelions.
" 19—Wild black cherry tree.
" 22—Grape hyacinth.
" 22—Garland Flower *(Daphne Cneorum)*.
" 23—Vinca, several varieties.
" 23—Anemones and alpine poppies.
" 23—*Adonis vernalis.*
" 23—*Doronicum Caucasicum.*
" 24—Sand cherry.
" 24—Currant bushes.
" 24—Siberian Pea-tree *(Caragana)*.
" 25—Pear and cherry trees.
" 25—Lilacs, several sorts.
" 25—June berry.
" 25—Polemoniums.
" 27—Pæonies and Irises.
" 29—Honeysuckles and barberries.
" 31—*Pyrus baccata.*
" 31—Mountain Ash.
June 1—Strawberries.
" 2—Buckthorn bushes and hedges.
" 4—Forget-me-not.
" 4—Ginnalian maple.
June 4—Rhubarb.
" 4—Mountain Centaury.
" 4—*Ajuga Genevensis.*
" 4—*Anemone narcissiflora.*
" 7—White Dutch clover.
" 8—Alsike and sainfoin.
" 8—Raspberries and blackberries.
" 8—Sharp-leaved common Cotoneaster.
" 8—Alliums.
" 8—*Rosa rugosa.*
" 8—*Spiræa VanHouttei.*
" 12—Golden-leaved Spiræa.
" 12—Highbush Cranberry *(Viburnum Opulus)*.
" 14—Geraniums.
" 14—Wild vetch.
" 19—Large red poppy.
" 19—Strawberry-flowered Cinquefoil.
" 10—*Lupinus.*
" 21—Golden Groundsel.
" 21—Wild Mustard.
" 21—*Dictamnus.*
" 23—Locust.
" 23—*Rosa multiflora Japonica.*
" 24—English horse beans.
" 28—Broad-leaved Bellflower.
" 28—*Anchusa altissima.*

July 1—Sweet clover *(Melilotus albus).*
" 8—Asparagus.
" 8—Grass Peas.
" 8—*Lathyrus sylvestris Wagneri.*
" 8—*Eremurus altaicus.*
" 8—*Sedum Kamtschaticum.*
" 8—*Thalictrum aquilegifolium.*
" 11—Basswood.
" 14—Lilies, different varieties.
" 14—*Veronica*, different varieties.
" 14—Mulleins.
" 15—Double Queen of the Meadow.
" 15—*Linaria.*
" 15—*Asclepias tuberosa.*
" 15—*Agrimonia.*
July 18—Mignonette.
" 23—*Hypericum Kalmianum.*
" 27—*Echinops Ruthenica.*
" 28—*Lychnis.*
" 30—*Solidago.*
Aug. 9—Button Bush *(Cephalanthus occidentalis).*
" 9—Pumpkin.
" 9—Late-sown English horse beans.
" 11—Campanulas and Rudbeckias.
" 21—Sunflowers.
Sept. 1—Wild Asters.
Oct. 4—African Marigold.
" 4—Gaillardias.

Experiments with Comb Foundations in Sections.

As there has been in connection with the production of comb-honey a difference of opinion as to the proper size of foundation to use, a thorough test was made with comb foundation of different sizes in the sections.

The results show that it is of great importance that the sections should be filled up to the sides and bottom with comb foundation. On examining the different sections in this experiment, it was found that the smaller the piece of foundation was, the more holes or gaps there were around the comb in the sections, and the comb was thus less firmly fastened around the sides and bottom to the wood.

The following sizes of comb foundations were tested :—

1. Full sheets fastened at the top and fitting closely to the sides and down close to the bottom.

4. Two inches square in centre of top section.

3. Quarter sheets across upper end.

4. Two inches square in centre of top of section.

5. One inch square in centre of top of section, besides a narrow strip of about half an inch across top and bottom.

6. No foundation at all.

From past experience, I would recommend that full sheets be always used. The bees worked on the full sheets first, and these were filled more evenly and very much better.

Many inquiries are made why bees will not work in supers, when the other colonies in the same apiary are working on drawn combs in extracting frames. The explanation is that the pieces of foundation in the sections were too small. Many bee-keepers, even experienced bee-keepers, do not put much foundation in the brood chamber when hiving new swarms, though they put full sheets in the supers ; consequently, the bees fill the sections in the supers first.

The experiment with different makes and sizes of hives was not completed owing to the very poor season.

House Apiary.

The House Apiary has again been tested and has worked very satisfactorily, as far as summer management is concerned ; but, for wintering, every one of the past six winters it has proved to be a failure.

Returns.

The experience of the past season has been a repetition of that of 1899. Reports from most parts of Ontario and Quebec show that there has been a very poor honey

flow, poorer even than 1899. In many places no surplus was secured, and bees have had to be fed more or less during the autumn.

Swarming was also poor on account of the shortage of honey. All the swarms that came out at the Experimental Farm Apiary were made to go back to the mother hives or were put with weak colonies ; 18 of the old colonies were doubled up, leaving now on hand 42 colonies.

The returns from the experimental apiary show an average of only 13 sections per colony. The colonies which were run for extracted honey gave 19 pounds per colony.

John Fixter.

Appendix A.

An Ontario bee-keeper wrote as follows to Mr. Wm. McEvoy, Inspector of Foul Brood for Ontario :—

'Dead brood appeared in half of my colonies. There would be from one to five or ten dead larvæ in a colony, and some of these I often found in capped cells, when I opened them with a penknife.

'I tried the starvation plan. Several of the colonies I starved twice, as the larvæ continued dying. I even destroyed two sets of foundation. Just think of the time and patience required to look into every cell in 80 colonies ; this I did several times. I had made up my mind to clean them up. I have melted many a score of white combs and super combs. I wish to be first on your list for inspection next summer. I may buy a lot of colonies which will be subject to your inspection.'

Mr. McEvoy's answer is full of valuable information :—

'Your colonies ran out of unsealed honey while they had a large quantity of brood on hand to feed, and then your bees did not uncap the sealed stores fast enough to keep pace with the amount of brood that required feeding, and the result was that considerable brood died of starvation. And some time after that the brood would suffer in proportion to the length of time that the brood nest was short of unsealed stores, and it would end in an increase of starved brood, which the bees would allow to remain in the combs for some time after the honey flow commenced. You never would have found one cell of dead brood in any of your colonies if you had kept them well supplied with unsealed stores. You may say that I am very much mistaken as to the cause in your case, but I am not ; I have travelled over every inch of this line for fully twenty years and from close observing, feeding and watching results, I have found that such is the cause why the bees fail to feed all the brood at certain times.

'On the night of May 28, 1889, we had a killing frost all over the province of Ontario, which was followed by several days of wet weather. That frost coming at the end of one of the warmest and most favourable springs ever known for bees, was a serious thing, because it caught all hives full of brood and suddenly stopped all the honey flow at the time when every colony had an immense quantity of larvæ to feed. I warned every bee-keeper at that time that he could look out for a wholesale starvation of brood and a very small crop of honey if he did not go to work and feed his bees so as to give them a chance to feed the larvæ. I kept my brood chambers well supplied with unsealed stores (through uncapping and feeding) until the honey flow began again. By thus doing, I secured one of the largest yields of honey I ever took, and I did not see one cell of dead brood. Late in the summer of 1889, many a bee-keeper became very much alarmed when he found his brood chamber in a rotten state with dead brood. Spraying of combs, starving the bees, and other methods were resorted to, to stamp out the dead brood. If these men had gone to work right after that great frost of May 28, and kept the brood chambers well supplied with unsealed honey through uncapping a part of the old sealed stores at one time, then another afterwards, and so on until the honey flow began again, they would have had

the most of the old honey used up and more space filled with brood ; at the same time they would have had an increase in the number of the bees and would have secured a much larger yield of honey ; there would have been also no dead brood. The very wet weather that set in all over the province in the last half of May and first week in June, was very hard on the constitution of thousands of colonies, because it prevented any honey gathering during that long rainy time, and after the bees used up the unsealed honey (a thing they always use first) they did not uncap the old sealed stores fast enough to keep pace with the large quantity of larvæ that required feeding ; the result was a lot of starved brood, weak colonies and a small honey crop in many places. During the three weeks of wet weather I kept my colonies well supplied with unsealed honey by uncapping the sealed stores from time to time until all was used up, and after that I fed the bees until they commenced to gather honey. When the honey season opened, the combs in every brood-chamber were full of brood, and a large number of bees were hanging out on the front of every hive. I then put supers on, and from ninety colonies in that off season I took over 10,000 pounds of clover honey and left abundance for the bees to winter on. Last season I kept my colonies supplied with unsealed honey between fruit bloom and clover bloom, and when I finished extracting the balance of my crop in the fall I found I had taken over 11,000 pounds of clover honey from 100 colonies, and left plenty to winter the bees. You say that you tried the starvation plan and the dead brood showed up again ; also that you starved several of them twice. I am certain that dead brood (starved brood) would not have shown up again after you put the bees on foundation, if you had fed the bees freely until they began to gather honey. You also say that many a score of white comb you melted. What a loss ! These beautiful combs should not have been melted. With different management you could have made $250 or more, and saved all the combs and yourself from a world of worry.' —J. McEvoy.

WEEDS.

SPRAYING FOR DESTRUCTION OF MUSTARD.

In my last report an account was given by Mr. Frank T. Shutt, M.A., F.R.S.C., Chemist to the Dominion Experimental Farms, of some experiments carried out by him, with the assistance of the Horticulturist of the Central Experimental Farm, to test the efficacy of the French method of eradicating Wild Mustard by spraying infested growing crops with solutions of copper sulphate. The conclusion arrived at from these experiments was, that a 2 per cent solution of copper sulphate, applied at the rate of 50 gallons to the acre, when the mustard plants were young, was the most effective, safest (as regards the grain crops) and most economical to use. The average cost of this application would be $1 per acre.

During the past summer, the Horticulturist, having men and horse-power at his disposal, again tested this remedy, and the results were again successful, although the experiment was carried out rather late in the season, and under certain other disadvantages as to the nature of the crop infested and the weather which prevailed at the time.

Mr. Shutt has drawn my attention to an important article on the subject, entitled 'The destruction of Charlock,' by Dr. J. Augustus Voelcker, in the Journal of the Royal Agricultural Society of England, vol. X, pt. 4, pp. 767-775, which, on the whole, confirms Mr. Shutt's conclusions and gives much valuable information on the subject. One quotation from a report made by Mr. Wm. Carruthers, the Consulting Botanist of

the Royal Agricultural Society, on some of the experiments referred to, is of particular interest to Canadian experimenters, who have been disappointed at the results sometimes obtained when spraying has been tried for the destruction of mustard in districts where the Bird Rape (also called Kale, or Smooth-leaved Charlock) is abundant. This is particularly the case in Manitoba, where by far the greater proportion of the plants called Wild Mustard are really Bird Rape *(Brassica campestris,* L.) 'I have not been able to detect anything in the structure of the Charlock that should make it so readily a prey to the copper sulphate. This is still more remarkable when we find that it does not in the least injure another species in the same genus, which in Cumberland is known as the "Smooth-leaved Charlock." This plant, the *Brassica campestris* of Linnæus, is very common in some districts. A correspondent in Cornwall writes that it is very common in his county. He has observed that while the common Charlock is easily destroyed by copper sulphate, the smooth-leaved plant is quite uninjured by it. This is probably the explanation of the difference in the testimonies as to the influence of copper sulphate on Charlock. The two plants so closely resemble each other that only a careful observer can distinguish that they differ. The true Charlock *(Brassica Sinapistrum,* Boiss.) is destroyed by treatment, while the smooth-leaved Charlock (*Brassica campestris,* L.) is not affected.

'As the general outcome of Mr. Hornsby's experiments, it would seem that for Charlock when still young, 40 gallons per acre of 2 per cent solution of sulphate of copper would be found effectual, but that, if the Charlock were already in flower, as much as 60 gallons of a 4 per cent solution would be required.'

REPORT OF THE POULTRY MANAGER.

(A. G. Gilbert.)

To Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I beg to inclose herewith the thirteenth annual report of the Poultry Department.

Some space has been devoted to the results of observations made during the past three spring seasons in connection with the hatching of early eggs from hens which laid all winter and were gently stimulated to do so. The conclusions arrived at will doubtless be useful to the many persons interested.

The matter is an important one, as it has direct bearing on the profitable results, or otherwise, attached to the hatching and rearing of early chickens by artificial or natural means. It is well worthy of further careful scientific investigation.

Information is also given, in detail, on the several points of poultry raising and best methods of fattening, killing, dressing and packing of the birds for shipment to British markets, or for home consumption.

The characteristics of the leading Standard breeds are described and the weights of the fowls given. Cuts of the leading breeds are also given.

During the year addresses on subjects akin to my department were delivered at the following places, viz. :—

Ontario.—Peterborough, Lansdowne, Gananoque, Toronto, Guelph, Renfrew.

Quebec.—Brigham, Mansonville.

Prince Edward Island.—Marshfield (2), Alberton, Centreville (2), New Glasgow, Montague Bridge, Murray Harbour South, Eldon, Kensington, Tyne Valley, St. Peters.

British Columbia.—Lulu Island, Central Park, Port Hammond, Abbotsford, Mission City, Chilliwack, Metchosin, Royal Oak, Ganges Harbour, Duncan's, Ladner's, Surrey Centre, Agassiz, Langley.

Manitoba.—Neepawa, Portage la Prairie, Carberry, Brandon, Winnipeg, Emerson, Morris, Morden, Manitou, Pilot Mound.

A feature of the Renfrew meeting was a large display of dressed poultry, consisting of turkeys, geese, ducks and chickens. The birds were divided into numerous classes, for which prizes ranging from $7 to $1 were given. This brought out a large number of competitors. Several chickens dressed in most approved methods were taken from our poultry department. At the meeting held in the afternoon, after the fair, the manner of plucking, dressing and drawing the chickens was explained. The object lesson was much appreciated.

I have again the pleasure of testifying to the faithful services of Mr. George Deavey.

The marked increase in correspondence and requests for information in regard to all phases of poultry keeping, is an evidence of the rapid development of that branch of farm work.

I have the honour to be, sir,
Your obedient servant,
A. G. GILBERT.

Central Experimental Farm,
Ottawa, November 30, 1900.

REPORT ON THE WORK OF 1900.

The farmers of the country, with other poultry keepers, have, during the past two years, given more attention to the artificial hatching and rearing of chickens than ever before. As a result, during the past year a large number of letters have been received asking for information on the subject.

At present the artificial hatching and rearing of chickens is carried on in two ways, viz. :—

1.—By joint stock companies, with large plants, in charge of practical proprietors, or expert managers.

2.—By farmers and small poultry keepers, who use one or two incubators and outside brooders, and whose operations are comparatively limited.

In the first case, the aim of the companies is to make the egg product of the most value by converting it into early broilers, to sell at $1.25 to $1.50 per pair during the high-price season. In some cases operations are continued the greater part of the year. In others the sale of eggs from thoroughbred stock for hatching purposes in spring, and eggs for eating purposes during the winter time of high prices, are combined.

In the second case, the aim of the farmer seems to be :—

1. To raise as large a number of early chicks at the same period as possible, and so have them of uniform age.

2. By so doing to avoid comparatively late hatching by hens.

3. To secure a number of pullets, of same age, to make early layers.

4. To have a large number of early cockerels of uniform age to sell when prices are highest.

There are two methods by which the farmers may attain their object, viz. :—

By filling the incubator and beginning operations in late February, or, early March.

By deferring hatching operations until the middle of April, by which time the hens have had a run outside, and as a result their eggs will hatch better.

Experience has shown that there are difficulties to be met with, in the first method, in the shape of weak germs and weakling chickens, and that until a remedy is found for these obstacles, the farmers will find the second method slower, but certainly surer, in the attainment of their object. The difficulties in connection with the first or earlier method are enumerated and discussed further on, as well as investigation in connection with them, so far as made.

Up to date the experimental work in our poultry department has been conducted in connection with the early hatching of chickens by means of both hens and artificial means. The experience so far gained fully warrants the farmers in desiring some other means, than hens, by which to secure May chickens of uniform age and in paying quantity.

SOME POINTS IN FAVOUR OF SECOND METHOD.

In connection with the second method experience has shown that as soon as the snow is off the ground, and the hens have had a run out, that their eggs hatch satisfactorily. Unless the farmer has a brooding-house, which permits of his being independent of outside temperature, he will have to content himself with incubator and outside brooder. After the hens have had a run out, for some little time, the eggs are saved, the incubator filled, and the chickens hatched in first or second week in May. His outside brooder is placed on the rapidly growing grass, and with proper care and food the young chicks will be found to make famous progress. In this way

several farmers in the neighbourhood of Carleton Place, Ont., in May last, raised many hundreds of chickens. A visit to the farm of Mr. Alexander McLean, of Ramsay, near the town named, in the month of July last, showed 161 fine Barred Plymouth Rock chicks, and on the same day to the farm of Mr. Joseph Yuill, in the same locality, 350 fine chicks, also Barred Plymouth Rocks. Results were obtained in both cases by the successful operation of incubators, and outside brooders, by the wives of the farmers named. The chickens in both cases made rapid growth, and in the latter instance were sold at the end of August to a Toronto fattening firm for 11 cents per pound live weight. Both were satisfactory instances of the second method, as outlined above, and recommended to farmers who use artificial means.

COULD THE SAME RESULTS HAVE BEEN SECURED WITH HENS ?

It may be said that the same results could have been secured by the use of hens. But experience has shown that it is almost impossible to get a sufficient number of broody hens early enough in the season wherewith to hatch out the number of chicks of the same age, so much desired. By the time a sufficient number of sitters could be secured under ordinary circumstances, the season would be advanced and the chickens unavoidably late. Again, the freedom of the chicks hatched and reared by artificial means, from lice, is a great factor in the rapid progress of the young chicks.

DIFFICULTIES MET WITH IN FIRST METHOD.

In connection with the first alternative, viz., the hatching of chicks from eggs laid by hens before the latter have had a run outside, the following experience has been gained :—For three seasons past an incubator of medium capacity was filled at end of March with eggs obtained from hens, the majority of which had laid well during the winter season previous. The fowls were also in comparatively limited quarters and had been gently stimulated to lay. From the period of going into winter quarters—beginning of December until the snow went off the ground—it was impossible for them to run outside. The results obtained were most unsatisfactory, and the conclusion was arrived at that machines, condition of stock, methods, or men, or a combination, were at fault.

During the three seasons that observation was made of the eggs while hatching, and subsequently of those which did not hatch, results unmistakably showed :

1. A fairly satisfactory number of fertile eggs.

2. A large percentage of dead chicks in different stages of development from 10th to 18th days.

3. A number of fully developed chickens dead in the shell about pipping time.

4. That it was not so hard to get the fertilized egg, as the strong germs so necessary to hatch the robust chickens.

SIMILAR EXPERIENCE ELSEWHERE.

So important was it considered to ascertain the cause, or causes of the unsatisfactory results enumerated and to find a remedy therefor, if possible, that leave was asked for and obtained for the purpose of visiting the experts in charge of some of the large Canadian plants. A visit was first paid to the poultry department of the Ontario Agricultural College at Guelph, and the subject was thoroughly discussed with the manager of that department, Mr. W. R. Graham. His establishment embraced an incubator room, and commodious brooder-house of the most approved plans. His opportunity for investigation and observation was therefore exceptionally good. His experience was that early January eggs gave 50 per cent of results, but that later eggs were most unsatisfactory, and were so until the breeding stock had

run outside. He had taken steps to investigate the matter. His opinion was that the long confinement and continuous laying of the hens during their winter confinement, with lack of exercise, were predisposing causes.

Mr. Graham considered the matter of such importance that he accompanied me to the poultry department of the Massey Farm, East Toronto, and to the large poultry establishment of the Toronto Poultry and Garden Produce Company, at Eglington, North Toronto.

With these managers, views were exchanged, and the subject thoroughly discussed from its different standpoints.

The experience of these managers was similar to that of Mr. Graham, and my own, viz., that eggs from hens which had been confined to limited quarters, during winter, and were stimulated to lay during that period, had not given good results. The general opinion was that eggs laid by hens, properly mated, at the beginning of the season, late November or early December, would likely give better results than those laid at the end of the season. This opinion seems also to be that of the managers of the large broiler establishments of the Eastern States of America, who announce that with the view of securing a larger percentage of chickens than heretofore, that operations will commence this year in November, a month earlier than usual.

COMPARISON BETWEEN HEN AND INCUBATOR.

In order to make comparison between hens and incubators as hatching mediums, during the early season of the past two years, a number of eggs were put under the hens at the same time that others collected under the same conditions were placed in an incubator. The eggs were examined from time to time. The difference in the phases of progress were detected and finally the same percentage of fertile eggs were hatched. When the embryo was not robust enough to make progress, it died under hen as well as in incubator. This showed that the opinion entertained by some persons that eggs will hatch under a hen when they will not do so in an incubator, was not borne out by results in these trials.

CONCLUSIONS ARRIVED AT.

While scientific investigation into this important branch of poultry development will inevitably take time, observation and experimental work so far has shown :—

1. That early spring eggs from hens which have laid steadily all winter and have been gently stimulated to do so, are not likely to produce a satisfactory percentage of strong germs.

2. That eggs from the same hens after they have run outside give much better results.

3. That the condition of the laying stock at end of winter seems to be the source of trouble.

4. That investigation so far has not made clear the exact cause or causes of that condition.

INVESTIGATION COMMENCED.

Already scientific investigation in connection with the subject has commenced. In a bulletin issued by the Rhode Island (U.S.) Experiment Station, last spring, it is stated 'that in very many cases the loss of newly-hatched incubator chicks has been the sole obstacle to success.' And one of the principal causes is attributed to 'inherited

constitutional weakness.' And which may also be said to be the cause of so many chicks dying in the shell, near the hatching period. The foregoing conclusions seem to point to a faulty condition of the breeding stock, and to justify our own conclusions in that respect.

In our poultry department steps have been taken to ascertain whether the eggs of December will give stronger germs and more of them than those of early March, when the vitality of the laying stock is presumably less. With this object in view, two pens of eleven two-year old hens, and two of pullets, have been mated up. When sufficient eggs have been collected they will be placed in an incubator and results noted.

BREEDING PENS MADE UP.

On January 15 the following breeding pens were made up :—

Breeds.	Cocks.	Cockerels.	Hens.	Pullets.
Barred Plymouth Rocks	1	..	8	..
White Plymouth Rocks	1	..	7	..
Langshans	1	..	7	..
White Wyandottes	1	..	10	..
White Leghorns	1	..	8	..
Black Minorcas	..	1	8	..
Brown Leghorns	1	..	8	..
White Minorcas	1	..	5	..
White Indian Game	1	..	..	4

Crosses.

Light Brahma, male, mated with.......... 4 Barred P. Rock hens.
Barred P. Rock, male, mated with .... 8 W. Leghorn pullets.

MANAGEMENT OF THE SITTERS.

When the hens became broody, they were set in wooden boxes placed in vacant pens of No. 2 house. The pens were 7 x 9 feet in size, and no more than four sitters were allotted to a pen. The wooden nest boxes contained no bottoms, and had a hinged door in front The nests were made of dry lawn clippings, which were found to answer the purpose much better than the cut straw used in previous years. Grain, grit and drink-water were constantly before the sitters. On being made, the nests were thoroughly dusted with a disinfecting powder, and so were the sitters, before being put on the nests. If the sitters are not so dusted at time of sitting, and during the hatching period of twenty-one days following, they are apt to become infested with vermin. It was found beneficial to place two or three china eggs in the nests as arranged and allow the broody hens to sit on them, for a day or two The sitters having proved reliable, the china eggs were removed and replaced by the valuable ones. In the case of borrowed sitters this will be found a wise precaution, as will also the thorough ridding of the birds of any vermin that might be on them. In the morning the doors of the nest boxes, which had been closed from the previous day, were opened and the sitters allowed opportunity to get out for food, water and a short run. In early spring, when the weather is likely to be cold, the sitter should return to her nest inside of ten minutes. Some space is given to the foregoing details because they are all important in the successful hatching of chickens by hens. Where incubators and brooders are used they do not, of course, apply. (*See* cut of nest box.)

The following list shows the number of eggs set under hens and result in chickens:

EGGS SET AND CHICKENS HATCHED

When Set.	Description of Eggs.	When Hatched.	No. of Chicks.
April 7.	6 B. P. Rocks, 7 W. P. Rocks	April 28..	2
" 20.	13 W. Wyandotte (from A. G. Goodacre, N.S.)	May 11..	11
" 20.	13 " " "	" 11..	11
May 2.	13 White Indian Games	" 23..	10
" 2..	13 " "	" 23..	6
" 3.	13 B. P. Rocks	" 24..	10
" 3.	13 Langshans	" 24..	7
" 3.	13 "	" 24..	8
" 3.	13 Buff Leghorns	" 24..	8
" 4.	13 "	" 25..	6
" 5.	13 Silver Laced Wyandottes	" 26..	11
" 10.	13 Andalusians (from Guelph, Ont.)	" 31..	8
" 10.	13 " "	" 31..	8
" 14.	13 " (from Rigaud, Que)	June 4 .	6
" 14.	7 Andalusians, 6 W. Minorca	" 4..	6
" 19.	6 P. Rock—Brahma cross, 6 P. Rock—Leghorn	" 9..	5
" 19.	16 B. P. Rocks (from Guelph, Ont)	" 9..	5
" 19..	14 "	" 9..	5
" 28..	13 B. Minorca (from Maxwell, Ont.)	" 18..	3
" 30..	13 W. P. Rocks (from Guelph, Ont	" 20..	4
" 30..	13 Andalusians "	" 20..	9
	257 About 20 settings, average result about 58 per cent.		149
	Hatched by incubators		235
	Total		384

It will be noticed in the foregoing list that of twenty-six eggs from Grand Pré, N.S., twenty-two chickens hatched. Such results from eggs which had come so far were highly satisfactory and were indisputable evidence of strong germs, the result of robust breeding stock. Some of the later and smaller hatches were due to eggs more or less shaken up in transit or to clumsy sitters. The eggs from Nova Scotia were carefully and skilfully packed in a small box with egg compartments. Past experience, in obtaining eggs from a distance, has shown that the principal factors in obtaining satisfactory results are :

1.—Robust breeding stock, which give the strong germs.

2.—Fresh eggs.

3.—Careful selection and packing.

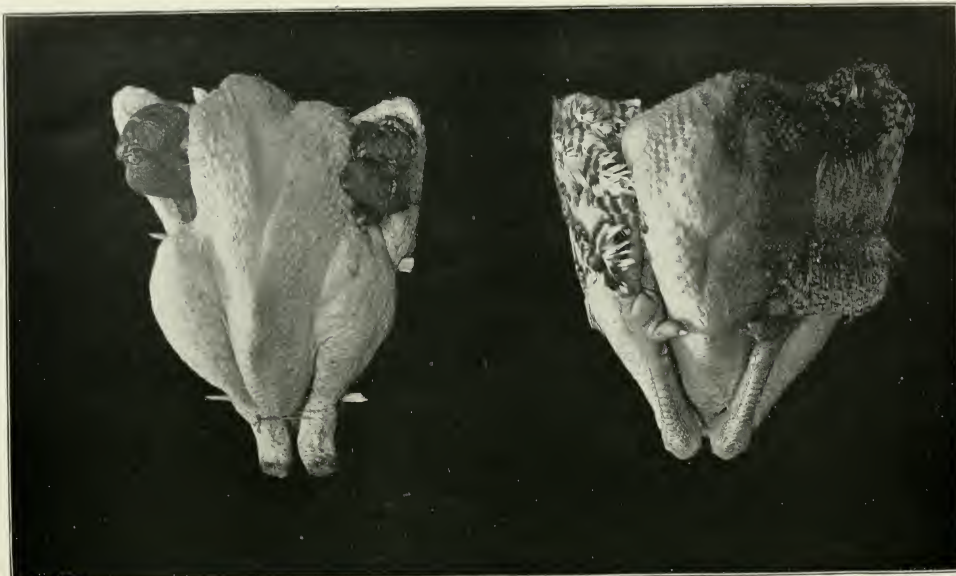
4.—Careful handling *en route*.

5.—Purchasing from experienced breeders.

On the part of the purchaser, care in hatching the eggs by natural or artificial means is also necessary. The responsibility does not altogether rest with the breeder who sells the eggs.

CARE AND GROWTH OF THE CHICKENS.

As in former years the late April and May hen-hatched chickens did the best. Experience has proved that the farmer who uses the natural means will get best results by having his chickens out in the first two weeks of May. In a previous page it has been shown where the wives of farmers have used incubators and brooders with great success in so doing. In the poultry department the chickens hatched by hens and incubators made satisfactory progress. In the case of the hen-hatched chickens the



Light Brahma and Plymouth Rock cross dressed for the home market. Seven months old, weight of the pair when killed, 8 lbs. 6 oz.

latter were permitted to remain in their nest for twenty-four or thirty-six hours, when with the mother hen they were placed in a slatted coop on the grass outside. The coop was so arranged that it could be securely closed at night while ventilation was secured. Through the slats the chicks could run on the grass outside, while the hen remained inside. On the floor of the coop was sand to the depth of two inches. On taking the mother hen from her nest she was given food and water. She had been probably thirty-six hours on the nest bringing out her chickens and deserved the attention. Apart from this she would be more likely to brood the chicks contentedly, after being fed, than if hungry or thirsty. How important it is to have early chicks carefully brooded is well known to all experienced breeders. The rations and treatment of former years were adopted, viz., stale bread crumbs followed by stale bread soaked in milk and squeezed dry. This for a day or two, when granulated oatmeal was given. Crushed corn was not given until after eight days, and whole wheat was not fed until twelfth or fourteenth day. As the chicks grew, a mash composed of shorts, cornmeal, stale bred and a small quantity of prepared meat was mixed with boiling skim milk, allowed to cool and was given three or four times per day. Occasionally small potatoes were boiled and mixed into the mash. Milk and water were both furnished for drink.

The incubator-hatched chickens were allowed to remain in the nursery of the machines for twenty-four or thirty-six hours when they were put in the brooders outside. The chicks were fed the same rations as those outlined above.

WEIGHTS OF CHICKENS.

On the above rations the chickens made the following development :—

No. 6—	B. Rock	cockerel,	hatched	April 28,	weighed	August 11,	3 lbs. 8 oz.—	September	11,	5 lbs. $3\frac{1}{2}$ oz.
74—	W. Wy	"	"	May 11	"	" 11,	3 " 10 "	"	11,	5 " 6 "
78	"	"	"	" 11	"	" 11,	3 " 3 "	"	11,	4 " 10 "
68	"	"	"	" 11	"	" 11,	2 " 15 "	"	11,	4 " 5 "
59	"	"	"	" 11	"	" 11,	2 " 14 "	"	11.	4 " 6 "
49	"	"	"	" 11	"	" 11,	3 " 1 "	"	11,	4 " 4 "
3—	B. Rock	"	"	" 11	"	" 11,	3 " 1 "	"	11,	4 " 14 "
73	"	"	"	" 24	"	" 11,	2 " 13 "	"	11,	4 " 11 "
5	"	"	"	" 24	"	" 11,	2 " 15 "	"	11,	4 " 4 "
52	"	"	"	" 24	"	" 11,	2 " 10 "	"	11,	4 " 3 "
	"	"	"	June 9	"	" 11	....	"	11,	3 " 10 "
	"	"	"	" 9	"	" 11	....	"	11,	3 " 8 "
	"	"	"	" 9	"	" 11	....	"	11,	3 " 10 "

A cross of Light Brahma, male, and Barred Plymouth Rock, female, produced fine, large, hardy birds, which grew rapidly and made flesh quickly. It was one of the best crosses tried in our department.

Three cockerels of the above cross hatched by incubator on June 9 and 16 weighed when killed on December 18, 8 pounds 6 ounces, 8 pounds 5 ounces, and 6 pounds 8 ounces, respectively. The plate on frontispiece shows the appearance the birds presented when dressed for market.

EGGS LAID BY DIFFERENT BREEDS IN SIX AND A HALF MONTHS.

Breeds.	From December.	January.	February.	March.	April.	May.	June.	Up to 6th July when hens ran outside.	Totals.
12 B. P. Rock hens	18	44	38	83	95	36	32	12	358
10 " pullets	24	57	75	112	90	75	60	14	507
8 White Leghorn hens	18	34	33	66	119	106	127	25	528
8 " pullets	56	127	116	97	104	51	103	9	663
8 Black Minorca hens	37	79	91	124	113	109	120	16	680
9 " pullets	30	116	140	119	119	87	97	4	712
3 Andalusian hens	15	42	26	38	25	37	26	7	216
8 Langshan hens	36	125	104	95	136	125	71	12	704
10 W. P. R. hens	29	67	83	84	68	33	34	8	406
9 " pullets	19	32	35	54	59	46	87	4	336
10 White Wyandotte hens	26	66	70	81	55	42	6	5	351
9 " pullets	6	83	105	71	47	32	41	......	385
6 Coloured Dorking hens	30	41	41	57	......	Sold.	....	....	169
6 Buff Leghorn hens	37	54	49	54	83	57	95	11	440
12 Mixed hens	79	92	82	106	71	73	89	10	602
9 " pullets	......	56	71	67	67	68	79	8	416
8 Brown Leghorn hens	65	110	103	123	123	109	133	10	776
9 " pullets	74	125	111	124	94	97	102	19	746
5 White Minorca hens	29	32	47	39	50	40	44	5	286
8 " pullets	28	45	54	41	60	27	40	5	300
4 White Indian Game	......	14	73	58	61	29	39	5	279
12 P. R. W. Leg. cross	2	75	136	92	112	95	110	13	635
	658	1,516	1,683	1,785	1,751	1,365	1,535	202	10,495

The hens named in above table were under two years of age.

WHEN THE PULLETS COMMENCED TO LAY.

Barred P. Pullet (hatched May 24)	December 6
White " (hatched May 26)	" 4
Buff Leghorn Pullet (hatched June 16)	" 2
Langshan Pullet (hatched May 24)	" 24
White Wyandotte Pullet (hatched May 11)	" 24

WHEN WINTER LAYING COMMENCED.

The winter season was unusually early and the snowfall of the middle of November compelled the closing in of the laying stock at that period. The birds were in good health and condition with the exception of the Langshan and White Plymouth Rock hens, several of which had not completely got over their moult. The first hens to lay were Barred and White Plymouth Rocks, Brown and White Leghorns, and Black Minorcas. Winter laying commenced 18th November.

NUMBER OF EGGS LAID DURING YEAR.

December, 1899	658
January, 1900	1,516
February	1,683
March	1,785
April	1,751
May	1,365
June	1,535
July	1,089
August	661
September	438
October	221
November	176
	12,878

PRICE OF EGGS DURING YEAR.

The price of new laid eggs during the year was unusually good, particularly so during the summer months. In the midsummer months the average price per dozen was 15 cents. In the fall months from 18 to 25 cents were the prevailing figures on the market. In many instances private parties sold at the latter price much earlier in the season.

STOCK ON HAND.

On December 8, 1900, the following old and young stock were on hand :—

	Cocks.	Cockerels.	Hens.	Pullets
Barred P. Rocks	2	..	13	29
White "	1	..	9	7
Langshans	1	7	10	10
Coloured Dorkings	..	..	2	..
White Wyandottes	1	1	4	12
White Leghorns	1	..	10	..
Brown "	1	..	15	..
Buff "	1	2	6	11
Black Minorcas	..	..	12	5
White "	1	..	6	..
Andalusians	..	3	3	6
Indian Games	..	3	4	4
Crosses	..	..	12	12
	9	16	106	96

DISEASES OF POULTRY.

Inquiries as to poultry ailments have not been as numerous in recent, as in previous years, no doubt the result of better methods of care and treatment. The symptoms of the comparatively few cases described during the past year pointed to liver derangement of some sort, no doubt the result of overfeeding hens of older age than they should have been allowed to attain.

Germ Diseases.—In all cases of germ diseases the best and simplest treatment was advised, as well as the separation of the ailing birds from the well ones, and the thorough disinfection of the premises, after recovery. Indeed, as a precautionary measure, it is well to thoroughly disinfect the fowl-house once or twice every year.

Lice.—In several instances a remedy for lice-infected fowls and premises was asked for and given. In the case of fowls in limited number—one of the many forms of carbolic powder was recommended. When in large numbers one of the liquid preparations was advised as the most speedy way in which to meet the difficulty. These liquid lice-destroying preparations have, in recent years, been put upon the market and are said to be efficient. For red mites the remedy published in report of last year was advised, as follows :—A solution of

Corrosive sublimate	4 ounces
Common salt	4 "

Dissolve in two to four quarts of water. When completely dissolved dilute to 25 gallons.

With this carefully spray every crevice, nook and corner of the house, first removing and burning all movable wood parts.

As the solution is highly poisonous, care should be observed in handling it.

Follow by whitewashing the premises. Before returning the fowls to the poultry-house see that they are entirely free from vermin.

EXPERIMENTS IN THE PRESERVATION OF EGGS.

The following interesting results of experiments in the preservation of eggs by Mr. F. T. Shutt, Chemist to the Experimental Farms, is a continuation of the work begun by him three years ago. Full details of investigation, up to that period, are given in the report of the Poultry Department of last year, beginning at page 223. The results, as given in last year's report, have been widely copied and are yet the subject of much inquiry.

OTTAWA, December 29, 1900.

(The Preservation of Eggs by Frank T. Shutt, M.A.)

In the report for 1899 (page 223 *et seq.*) will be found a record of the results obtained, in two series of the experiments with certain solutions as egg preservatives. The preservatives employed were saturated lime-water, lime-water plus 10 per cent of common salt, 10 per cent solution of water glass (sodium silicate), 5 per cent glycerine, and distilled water. The coating of the eggs with paraffin was also tried. After a careful examination of the eggs, including poaching, we concluded that saturated lime-water gave by far the best results.

During the past year we have repeated several of the above mentioned trials and also tested the efficacy of certain other methods for egg preservation that have received attention from time to time in the press. The experiment was begun on June 5, and the eggs examined on December 10.

Three eggs from each experiment were poached.

Briefly stated, our results are as follows :—

A.—Eggs immersed continuously in saturated lime-water. Outward appearance, excellent ; yolks, non-adherent, of good colour and fairly globular ; albumin, somewhat more limpid than in fresh eggs, and slightly discoloured ; a very slight 'stale' odour ; air space, normal ; poached eggs free from all objectionable taste and of good appearance.

B.—Eggs first smeared with vaseline and immersed continuously in lime-water. Externally, somewhat darker than the foregoing and rather greasy ; yolk, globular and of good colour ; albumin, a very faint yellowish tint and somewhat limpid ; a very slight 'stale' odour ; air space, normal ; poached egg very similar to that in 'A.'

C.—Eggs continuously immersed in 2 per cent silicate of soda. External appearance good and very similar to that of eggs in lime-water ; yolk, globular and of good colour ; albumin, but very slightly discoloured, almost normal ; marked odour of a 'soapy' character which is further developed in poaching; air space, normal ; poached egg, of very good appearance, but with faint 'stale' flavour.

D.—Eggs continuously immersed in solution of 5 per cent of gum arabic and 1 per cent formalin. Outward appearance, inferior to those in foregoing tests ; yolks, attached to shell ; albumin, decidedly discoloured ; odour, not marked ; air space, normal ; appearance of broken egg much inferior to those in preceding test ; developing marked flavour on poaching.

E.—Eggs continuously immersed in 5 per cent gum arabic plus 5 per cent salicylic acid. Preservative solution quite mouldy and with a very bad smell. Egg-shells quite soft. The broken egg, though not unsightly, had a most nauseating odour and was quite unfit for food.

F.—Eggs continuously immersed in 5 per cent dextrin plus 5 per cent salicylic acid. Preservative solution very mouldy and smelling badly. Egg-shells soft, and contents unfit for food.

G. Eggs dipped momentarily in dilute sulphuric acid, then washed and stored in a large bottle. All exceedingly bad ; contents very offensive.

H.—Eggs dipped momentarily in sulphuric acid, washed and dipped in alkaline ammonium oxalate, then stored in large bottle. All the eggs very bad and contents offensive.

These experiments corroborate many of the results obtained last year, and give further proof of the excellence of the eggs preserved in saturated lime-water. We think that, on the whole, 2 per cent sodium silicate gives better results than the 10 per cent solution experimented with last year, but we are also of the opinion that lime-water is superior to both as an egg preservative. Moreover, it is cheaper and pleasanter to handle.

GENERAL INFORMATION

ON POINTS IN POULTRY KEEPING ASKED FOR BY NUMEROUS FARMER CORRESPONDENTS AND OTHERS.

Notwithstanding the large amount of information that has been distributed throughout the country, in relation to poultry-keeping in all its different phases by our experimental farm reports, during the past twelve years, there is yet a very great demand for further information on the subject. Poultry keeping by farmers and others is evidently making rapid development, hence the demand.

It is of primary importance that beginners should understand that successful poultry keeping is dependent upon the following conditions :—

A knowledge of the business.

A suitable house.

The proper breeds.

Proper number of fowls.

Suitable food and treatment.

Fowls of proper age.

Care and proper treatment of chicks from time of hatching.

A KNOWLEDGE OF THE BUSINESS.

In the world of commerce a knowledge of the business engaged in is considered necessary to success. Poultry keeping for profit is no exception to this rule. Letters are frequently received from correspondents to the following effect, 'that the writer has been engaged in the dry goods, or other business, in the prosecution of which he has lost his health. Being of the opinion that poultry keeping will be a means of restoring his health and making a livelihood, he desires to know quantity of land, quantity of grain to be grown, number of fowls, &c., necessary for success.' It is evident that the undertaking in the case of such a correspondent would be that of a specialist, which is the most advanced branch of poultry keeping. To ensure success, capital, a large plant and expert knowledge would be necessary. Such expert knowledge could be learned by attending one of the agricultural colleges, where a course of poultry keeping is taught, or by serving an apprenticeship at one of the large poultry plants. The knowledge might certainly be gained by experience, which would necessarily be lengthy and costly.

THE POSITION OF THE FARMER.

The position of the farmer is entirely different. It is essentially his business. He has already a certain knowledge of live stock, in the majority of cases of poultry keeping. His stock may not be thoroughbreds, his poultry house not of the latest or best pattern. But these are obstacles which can quickly and cheaply be removed. He has the grain, the green food and other essentials in abundance, in many cases almost in the shape of waste. To him the information contained in this and other experimental farm reports, is of the greatest value, because it can be, as it has already been in many instances, so easily converted into satisfactory results.

A SUITABLE HOUSE AND CONTENTS.

There is really no cast-iron rule as to the building of a poultry house, for conditions vary so much in different parts of the Dominion. But there are certain guiding rules that should be followed, viz. :—

As much light as possible.
A moderately comfortable temperature, say 40°.
As much room as possible.
The disturbance of the laying stock as little as possible.

The poultry house should face the south, with a window in that part—a double one in very cold regions—so that the sun can shine through it during the winter time. A board floor has been found best, because an earth one, if it becomes damp, which it is likely to do in cold weather, will remain so all winter. Again, unless frequently raked over, the loose top earth removed and renewed, it will probably become foul, and be the source of disease. On the board floor should be litter, composed of straw, oat hulls, cut leaves, &c., and this should be removed and renewed from time to time. The passage-way, if size of house requires one, should be on the north side, and the front of the pens so arranged that the collecting of the eggs, cleaning of the platform, the feeding of the soft food and watering should all be done from the passage-way. This arrangement will much lessen the disturbance of the laying stock. Where it is possible to have a small pen for roosting and laying in, and a larger one, alongside, for a living and scratching room, the laying stock will be still less disturbed. By this plan, when the litter on the floor of one pen is being removed, the fowls can go into the other pen. Birds of the Mediterranean family are particularly sensitive to disturbance. The nests should be dark and secluded. Darkened and secluded nests tend to prevent egg eating, a vice much easier prevented than cured.

A dust bath in the shape of a square box, 5 x 5 feet, larger or smaller, according to the number of hens, is necessary. It should contain dry earth, or earth mixed with fine soft wood, or coal ashes, so that the fowls may dust themselves in it and keep their bodies free from vermin. Other articles requisite are a small box, 8 x 4 inches, to hold grit in one compartment, and oyster shells, or other form of lime, in the other, and a drinking fountain. A narrow trough, 6 or 8 feet in length by 3½ inches in width, is also necessary for the feeding of the cut bone or mash, whether this is done from the passage-way or inside the pen. No less than 6 square feet should be allowed to each fowl. A temperature of 40°is about the correct one. A correspondent in Winnipeg writes that he got best results from a temperature of 40 or 45 degrees. The birds should be divided into colonies of 15, 20 or 25 each. They will be found to give best results in small numbers, with plenty of room.

The poultry building should be kept clean and free from vermin. If disease is discovered among the fowls, the sick ones should at once be removed and the premises thoroughly disinfected. It is a good plan to disinfect and whitewash the house once or twice every year. The roosts should be kept dampened with coal oil. Scaly leg and the lodgment of lice are so prevented. Coal oil should be freely but discreetly used about nests, roosts, platforms, and wherever lice are likely to make lodgment.

THE PROPER BREEDS FOR THE FARMER.

The farmer evidently desires fowls which will give him eggs in winter, and later on rapid flesh-forming chicks. Both results may be secured by means of Plymouth Rocks or Wyandottes. This is not said with prejudice to other breeds. Of the two breeds named, Barred Plymouth Rocks and White Wyandottes are given first choice, not only on account of their good qualities, but because they can be had almost in any locality and at cheap prices. Experimental work, extending over many years, has shown that Barred Plymouth Rock pullets lay as well as any others. With proper care and feeding, from time of hatching, a pair of Barred Plymouth Rock cockerels should weigh, at the end of four months, 8 or 8½ pounds. White Wyandottes have low combs and a blocky flesh-carrying body, and for those reasons make excellent fowls for the farmer. Mr. A. G. Goodacre, of Grand Pré, N.S., writes that his strain of White Wyandotte hens laid eggs, seven of which weighed one pound. As to flesh development, the weights are given, in a previous page, of a number of cockerels hatched from eggs obtained from Mr. Goodacre. The characteristics of both Barred Rocks and White Wyandottes, with those of other standard breeds, are given in a following page.

PROPER NUMBER OF FOWLS.

From 100 to 150 hens should not overtax the resources or energy of the ordinary farmer. If he has help from wife and family, as many have, a greater number may be profitably kept. But it is not desirable, under any circumstance, to have more hens than can receive the care and attention so necessary for success. With judicious management and treatment of his stock, and proper sale of their products in eggs and chickens, each hen should yield a profit of $1 to $1.50 per year, over and above expenses of feed, which to a farmer should not be more than 75 cents per head for the same time.

SUITABLE FOOD AND TREATMENT.

In the preparation of the winter rations, calculated to incite their fowls to egg laying during that season, farmers should find opportunity to utilize much of the waste of their farms. The mash affords a means of doing so, as will be apparent in the following list of rations, which afford liberal range for choice, not only to farmers but to others.

RATION 1.—SUITABLE FOR USE BY FARMERS.

Morning.—Mash of whatever ground grains are in greatest abundance and cheapest, mixed with potatoes, turnips or carrots, boiled. Many of the vegetables named are in the shape of waste, and may be made good use of in this way. Add a small quantity of black pepper and a few pinches of salt, and mix into crumbly condition. Feed three mornings or afternoons of the week. For proportions in which to feed, see Ration 5. The mash may be varied occasionally by mixing in clover hay in lieu of the boiled vegetables. The clover hay should be well steamed before being used. After feeding scatter two or three handsfull of oats in the litter on the floor of the pens to start the hens to exercise in searching for it. Other three mornings of the week feed cut bone or meat in some shape. When mash or cut bone are fed in the afternoon, feed grain in the morning instead.

Noon.—A little more grain to keep hens in exercise.

Afternoon.—This ration should be thrown in the litter on the floor, before it is too dark, and should be fed in such quantity as to send the fowls to roost with a full crop. Wheat is the best grain. Buckwheat is excellent.

RATION 2.

Morning.—Two parts of ground oats, one part shorts, one part cornmeal, and a small quantity of animal meal. The latter should be omitted when cut bone is fed. Mix with hot water into mash and feed three times per week, morning or afternoon. Dust in small quantity of black pepper and salt. Other mornings, cut bone or other form of meat. When mashed or cut bone is fed in the afternoon, grain should be fed instead at morning ration.

RATION 3.

Morning.—Mix into mash, wheat bran, 2 parts; ground oats, 1½ parts; cornmeal, ⅛th part. Season with salt and add half a teaspoonful of black pepper. Feed three times per week. Start hens to exercise.

Noon.—Small quantity of grain to keep fowls searching for it.

Afternoon.—Same as No. 1.

The above ration is recommended for egg production by Mrs. Judy, a well known poultry keeper and writer on poultry subjects.

RATION 4.

The following ration was fed to a pen of White Plymouth Rocks, owned by Dr. W. S. Stevens, of McChanistown, Ohio, and which pen won the prize offered by the National Stockman, three years ago, for the largest yield of eggs per hen during the year. The average number of eggs per hen is given at 289.

Morning.—Equal parts of bran, wheat middlings, chopped corn and oats, with some fine beef meal mixed in and the whole made into mash.

Noon.—Wheat was thrown into the litter on the floor of the scratching shed to keep hens busy.

Evening.—Whole corn.

From April 1 to November 1 the same was fed, except that the morning mash was mixed with cold water and wheat was given instead of corn. The greatest of cleanliness was observed.

It will be noticed in the above that the fowls had access to a scratching shed, which climatic conditions permitted, and by which they received the benefits of change of air and exercise during the winter season.

RATION 5

The following ration and manner of feeding it has been found effective in our poultry department :—

Mash—Shorts	2 parts
Ground oats	1 "
Cornmeal	1 "
Small potatoes boiled	¼ "

The whole mixed with boiling water into a crumbly condition. This was fed in proportion of one quart (Imperial), weighed dry, to 15 hens, three times per week, in morning or afternoon. A little was fed to the pullets every day, but was found at end of January to be fattening the Barred Plymouth Rocks, and the feeding was reduced to three times per week and to the same quantity as fed to the hens. Cut bone in proportion of 1 pound to every 15 hens other mornings, or, afternoons when mash was not fed.

At 11 a.m., steamed lawn clippings were given in moderate quantity and were eaten with great relish. If fed too frequently, or in too great quantity they were found to make the hens crop-bound.

At noon a light feed of oats (5 pounds to every 100 layers) was thrown into the litter on the floors of the pens, to incite the fowls to continued exercise.

For afternoon ration, 8 to 10 pounds of wheat to every 100 hens was thrown into the litter and the fowls seemed to make active search for it.

Mangels were found to be the cheapest and most convenient form of green food, and were before the layers at all times and so were grit and crushed oyster-shells. Pure drink water was in abundance.

PROPER QUANTITIES TO FEED.

This has been found a very difficult matter to decide. Experience has shown that proportions of food that have answered in one case have not done well in another. Again, pullets have done well and given good results on a ration that would certainly have put older hens out of condition. Careful experiment, extending over a period of some years, with rations fed in different quantities, to different lots of hens, is requisite to lead to definite quantities.

Experience in feeding winter rations during past years has shown very clearly the following :—

1.—That variety in the rations and time of feeding are beneficial.

2.—That where there is such variety there are neither egg-eating nor feather-picking.

3.—That pullets will do well on rations, which, if fed in same quantity to old hens of the Asiatic or American breeds, will end fatally.

4.—That sameness in rations and too heavy feeding are likely to cause *enteritis* or inflammation of the intestines. (See report of 1897.)

The method of feeding adopted in our poultry department for some years past, has been with a view of avoiding over-feeding, and the evils resulting from it; simplicity and cheapness of rations, and affording variety which has been found to be the very spice of poultry life. Correspondents have said that amount of mash as advised in reports of 1897 and 1898 was not enough for winter use. Others have said that heat was the chief factor in obtaining the eggs. It is quite possible to have been under rather than over the mark, and it is equally probable that with artificial heat a less quantity of food had been found effective. In a cold poultry house more food would be required to get the same results as had been attained in a moderately warm one Which goes to show the benefit of a temperature in a poultry building of not lower than 40 degrees, as advised in this and previous reports. And under ordinary climatic conditions, and in a well-conducted house, it might be possible to obtain such a temperature without artificial means.

FOWLS OF PROPER AGE.

Experience has shown that it is not advisable to keep fowls of the heavy breeds over two years of age for the reasons that if kept until older they are apt to moult late and to put on fat easily. In the case of Leghorns, Minorcas, Andalusians and Hamburgs the birds may be kept until three years old. A simple and efficient way of keeping trace of the age of a fowl is to put a ring, made of wire, on one of her legs for each year of her life.

PROPER CARE AND MANAGEMENT OF CHICKENS.

Full particulars as to the proper care and management of sitting hens and of the chicks hatched by them will be found on a preceding page.

FATTENING OF THE CHICKENS.

If the chickens receive the attention and food as outlined, they should be ready to be sold to any of the large establishments which purchase chickens to fatten, and ship to the English market, or the farmer may prefer to dispose of them to special customers in the large cities, or, if he has them in sufficient numbers he may prefer to ship them to the agent of the Department of Agriculture in London, England, Mr. A. W. Grindley, first notifying the Commissioner of Agriculture and Dairying of such intention in order that arrangements may be made for their transmission by cold storage.

Should the farmer desire to specially fatten his chickens before sale, or shipment, his simplest and speediest plan is to put his birds at 3½, 4 or 4½ months of age, in slatted coops or crates divided into compartments to hold one, or a number of birds up to four. These coops should have V-shaped feeding troughs in front. The following fattening ration has been found most effective in our poultry department, viz. :—

Two parts finely ground oats.

One part finely ground barley.

One part ordinarily ground cornmeal.

After 15th day add beef suet in proportion of one ounce to every four birds. Mix with skim-milk. If the milk is made near the boiling point the tallow, which should be chopped fine, will be melted by it when poured on the ground grains. Or the tallow may be melted in the hot milk. The birds should be fed all they will eat twice a day. Carefully collect all uneaten food. Leave none to turn sour, and feed none in that condition.

Care should be taken to free the birds from vermin before cooping. This may be done by rubbing sulphur well into the feathers, or by one of the lice-exterminating powders.

Pens and premises should be kept scrupulously clean.

Grit and water should be supplied regularly. Three weeks should be sufficient to fatten the birds satisfactorily.

METHODS OF FATTENING ADOPTED BY FARMERS.

Several farmers have sent their methods of and foods used in fattening chickens. Some of them are given as follows :—

Mr. A. McPhadden, of Dominionville, Ont., states that his crates are made of common building lath, 4 feet long, divided into two compartments, with the bottom laths planed. Four chicks were put in each compartment.

Rations for first week were composed of 3 parts oats, 1 part pease.

Second week—Same as first, with a little cornmeal added.

Third week—Quantity of cornmeal was increased.

Three weeks' fattening was sufficient.

Cost of one pound flesh production, 5½ cents.

Mr. James Watson, of Sonya, Ont., described the rations used by him as follows :—

Two parts finely ground oats.

One part finely ground barley.

Mixed with skim-milk and fed 3 times per day for 3 weeks.

Thirty B. P. Rock cockerels weighing 167 pounds were put into crates on October 22, and fed on above rations. Gain made in first week, 24 pounds ; second week, 20 pounds ; third week, 12½ pounds. Cost of producing one pound of flesh, 5¼ cents.

Messrs. Armstrong Bros., of Fergus, Ont., describe the following as rations used by them :—

Morning—Two-fifths ground corn; two-fifths wheat bran; one-fifth wheat middlings. Fed 3 mornings. Other mornings ground oil cake was mixed into mash. Noon—Boiled potatoes and stale bread. Afternoon—Immediately after noon ration was eaten, the troughs were cleaned and filled with whole corn and wheat. This was allowed to remain before the birds for the rest of the day.

The birds were placed in slatted coops 16 x 20, and in each compartment 3 to 4 were put. Feeding lasted for nineteen days. Average gain, 1½ pounds each. During last week very little soft food was given. Water and grit were regularly supplied. No milk was used.

As showing the good results from careful attention to and proper feeding of the chicks from time of hatching until they were able to eat a mash of ground grains, a lady states that she had four Barred P. Rock cockerels weigh at end of three months respectively, 4 pounds; 4 pounds; 4½ pounds. Their soft food was composed of shorts, cornmeal, with the waste of the table and kitchen. No more than 5 pounds of hard grain were given.

THE FORCING METHOD.

Mr. Ernest Cobb, an English writer on poultry subjects, gives the following rules as observed in the large fattening establishments in England:—

When the purchased birds arrived they are placed by themselves in coops, separate from those being forced. They are called 'feeders.'

After being cooped the feeders are allowed no food for twenty-four hours.

After this short fast they are fed from V-shaped troughs—which are suspended in front of their coops—three times per day, all they can eat, of a thin mash, composed of finely ground oats, mixed with half water and half milk.

During the second week the water is gradually replaced by milk.

At end of second week a little fat is melted in the hot milk and mixed in the food.

At end of second week, perhaps a short time before, the birds do not eat as readily as they did and the 'crammer' or forcing machine is called into requisition.

The ration, as used in the 'crammer,' is ground oats and skim milk, sweet or sour, the latter preferred, to which is added fat (tallow in most cases) in proportion of a tablespoonful to each bird.

The mixture as used in the 'crammer' is of the consistency of gruel or thin porridge.

The same authority also says that the 'feeders' should be kept going (by hand-feeding) as long as they continue to put on weight. A bird should never be placed on the 'crammer' so long as it eats heartily. Experience has shown that after ten days or a fortnight most birds will not take enough food voluntarily to make weight. It is then that the forcing machine is brought in requisition.

English fatteners prefer finely-ground oats to any other kind of ground grain. Ground barley has been found too heating. Cornmeal puts on yellow fat and tends to give a tinge of that colour to the skin, which is very objectionable to the English buyer. In the United States a yellow skin is rather preferred, while it seems a matter of indifference to Canadian purchasers.

The birds are not allowed any food for twenty-four hours before being killed; the object is to have no food in the crop to decompose.

MANNER OF KILLING.

Birds intended for shipment to the English market should be killed by having their necks dislocated. When the bird is properly killed in this way the end of the neck should be two inches away from the head. After killing and during plucking the bird should be so held that its head will hang downwards, thus affording opportunity for the blood to drain towards and coagulate in the neck.

Another manner of killing is by cutting the roof of the mouth, at the base of the brain, lengthways and across, with a narrow-bladed and sharp knife, but birds so killed should only be sold on a local market.

PLUCKING.

Immediately after the neck is broken all sense of feeling ceases, and plucking should at once begin and be carefully done. On no account should the skin be torn or bruised in anyway. Mr. E. Cobb, the English authority already quoted, thus describes the operation : 'The immediate plucking of the bird is advocated because the feathers come away ten times easier directly after killing than if the bird is left alone for one minute only before starting. Many fatters never employ the thumb in plucking, excepting at a few places, and prefer slipping, as it were, one finger under the feathers and catching them as in a vice between the other fingers. Having cleared the neck down to within a couple of inches or so of the head, pluck the sides of the breast and the top of the back level with the wings, then do the wings, and work down the back to the tail, extract the latter, and, turning the bird over, finish up at the point that you left off on the breast, taking the legs on the way down.'

SINGEING.

Many of the English fatters singe their fowls. This should be done immediately after plucking and before the body is cold. It should be carefully done, so as not to burn the flesh. All the 'pin' feathers should also be carefully removed. The bird is now ready to be pressed.

The English practice before putting the bird into the 'press' is to tie the hocks together above the shank. The pressing machine is made by placing a board against a wall at an angle of 65 degrees. Or it may be made in the shape of a stand. In the latter shape it is made by placing two boards together at right angles. The birds are then placed breasts downwards, with sterns pressed against the wall, or slanting board and heads hanging downwards. A weight is placed on the backs of the chickens, so as to press their breast bones in flat, slightly crushing them in without breaking them. In the evidence of the Commissioner of Agriculture and Dairying, before the Agricultural Committee of the House of Commons, the operation is thus described : 'a glazed brick or other weight is laid on top, and another brick is put alongside to keep it in position until the next bird is pressed closely there. After the row is full the chickens are left lying on their breasts with a board laid on top of them, with sufficient weight to hold them firmly and crush the breast bones slightly'

The birds should be left in the press from two to six hours, at any rate until thoroughly cooled.

PACKING.

For shipment to England, the birds should be neatly packed in lightly made but strong cases or boxes, to hold twelve birds, six in the bottom of the case and six on top of the lower tier. The birds should be wrapped in clean white paper, and arranged so as to present a neat appearance on being unpacked. In packing, the heads of three birds should be at one end of the case and the feet at the other end. The other three birds should be arranged the opposite way, and so that they will neatly fit in.

TURKEYS.

THE BEST BREED FOR THE FARMERS—HOW TO KILL, PLUCK, DRESS AND PACK.

The *Fish Trades' Gazette, Poultry, Game and Provision Chronicle*, of London, England, speaks of Canadian turkeys as 'splendid birds, being equal to, if not superior, to the fine birds from the continent.' The same paper says that the styles of plucking, dressing and packing have much improved, and as a result a large trade in Canadian poultry, not only at Christmas, but at other times, is likely.

To comply with the conditions of the English market, it is of paramount importance that the birds be of the best quality. Next, that they are plucked, dressed and packed according to the best methods.

It is of first importance that our farmers breed the largest, best and hardiest birds. Climatic conditions, in the greater part of Canada, are favourable to the breeding of a large number of turkeys, indeed of all kinds of poultry. There are six varieties of turkeys, viz. :—Bronze, Narragansett, White, Black, Buff and Slate. Of these the Bronze are the largest and heaviest. The standard weights of this variety are :—

Cock............	36 pounds.	Hen..........	20 pounds.
Cockerel..........	25 "	Pullet .	16 "

The first requisite in successful breeding is strong, vigorous parent stock. Inbreeding should be avoided. It is admissable to use a good male two years, but not so to use a young male and pullets of the same family. Young hens weighing 15 to 18 pounds, and older ones of 18 to 20 pounds weight, are the best layers, and make the best mothers. One male with 10 or 12 hens is a good mating.

Some turkey hens lay more eggs than others. Eighteen to twenty-four eggs from each hen should be satisfactory. The turkey hen makes the best mother, although some breeders give the first seven eggs to a common hen. The objection to the latter is that she is apt to drag the young pullets too much about.

Twenty-five young birds are all that the turkey mother can keep dry and warm.

It is of first importance to keep the young birds in dry quarters. Great care is necessary in rearing them until they 'shoot the red,' (get wattles, &c.). It must be borne in mind that young turkeys before 'shooting the red,' are the most tender of all feathered fowl, and afterwards the hardiest.

Too early setting is not advisable in this latitude. Where the winters are milder and spring earlier it is different.

After hatching, the youngsters and their mother should be put in comfortable, dry quarters. Give a grass run if possible. The coop should be roomy, and so conveniently situated that mother and brood can easily be driven into it, in case of rain. Care should be taken that mother and brood do not get into the grass while wet with the morning dew. It is important to remember this. It is also well to remember that experienced breeders have traced the death of many young birds, in their early handling of them, to damp quarters, lice and indigestion, the latter probably from eating uncooked food. Unclean, carelessly mixed and uncooked food has been the cause of death in the case of many young and tender birds. The mortality among young turkeys, from one end of the country to the other, is far too great and is principally caused by neglect of the points outlined above.

PROPER RATIONS.

For the first few days feed on stale bread soaked in milk and squeezed dry. Mix with hard boiled eggs and onions, both chopped finely. Curd or a sort of cheese made from sour milk may also be given.

Later on feed on granulated oatmeal, rolled oats, or a mash made of stale bread, onion tops, oatmeal, cornmeal or middlings, the whole mixed with skim-milk. The milk should be boiled and a little black pepper dusted into it, before putting it into the mash.

For the first five or six weeks feed four times daily. Afterwards three times.

At the time of 'putting on the red,' uncooked food should not be fed. At this period the young birds are likely to eat ravenously, but on no account should they be allowed to gorge themselves. After becoming fully feathered they require nothing but hard grain.

Turkeys are fond of roaming, and often wander away from headquarters. In this way many are killed by weasels, skunks and other enemies.

A good plan is to feed the hens and their broods grain every evening, and so accustom them to coming home. This, of course, when the young birds have reached the proper age.

TO FATTEN.

Birds may be fattened as in the case of chickens while running outside, or by being penned up and specially fed. Success has attended the fattening of turkeys in many instances, by the forcing method. But with the right breed in the first instance, care and proper food, there should be no difficulty in obtaining the desired flesh development.

KILLING.

The birds intended for shipment to Great Britain are killed in the same manner as chickens, by dislocation of the neck. Care is necessary in having this properly done, as the following note of warning from a London poultry purchasing firm to an Australian agent, shows :—

'Having purchased the several consignements of frozen poultry which you have had on show in the exhibition, I have written you our opinion of same. A, the quality very good ; B, trussing very good; C, packing well done ; D, killing may be capable of being very much improved on, as the necks of the birds are invariably very much discoloured, and appear almost unsaleable through this. I would suggest bleeding at the mouth, and not so much force used in dislocating the neck. I consider there is a good market here for your poultry, if you can send it, say, to arrive in England continuously from January to June.'

It is not likely that bleeding at the mouth will be adopted by those firms who ship in large numbers. But if this manner of killing is adopted, it should be done as advised in the case of chickens killed in that way, viz., by the cutting of the roof of the mouth, at base of the brain, with a narrow sharp knife, lengthways and across. If the roof of the mouth is pierced at the base of the brain, death is said to be instantaneous and painless.

PLUCKING AND DRESSING.

This should be done as outlined in a previous page in the case of chickens. In plucking, which should begin immediately after dislocation of the neck and be very carefully done, feathers should be left on the neck for three inches.

PACKING.

Instructions as to packing issued by the Commissioner of Agriculture and Dairying, are as follows :—

Every bird should be wrapped neatly in paper, the head with a quantity of thick paper to absorb any blood. The birds should be packed with their backs down and heads to one side.

Twelve to twenty-four birds should be packed in a case. The case should be packed quite full, so as to prevent birds knocking about inside, during transit or in cold storage.

The case recommended is six feet long by twenty inches wide, and from seven to eleven inches deep. Top, bottom and sides are made of half-inch lumber, with a strengthening piece in centre, one-half inch thick.

The cocks and hens should be packed in separate cases.

The weights of the birds and their sex should be marked on the left-hand corner of both ends of the case.

A quantity of clean straw or wood pulp should be put on the bottom of the case and on top of contents, with wrapping paper between the birds and packing material, to prevent any possibility of injury.

SHIPPING BIRDS IN FEATHER.

In shipping birds in feather the following directions should be followed :—

Kill birds by cutting in roof of mouth as described in previous page.

Before being packed the birds should be thoroughly cooled. Pack in air-tight barrels.

In packing, the heads of the birds should be on the middle of their backs. The barrels should be marked so as to describe contents.

DUCKS

	Lbs.		Lbs.
Pekin Drake	8	Pekin Duck	7
Young Drake	7	Young Duck	6
Aylesbury Drake	9	Aylesbury Duck	8
Young Drake	9	Young Duck	7
Rouen Drake	9	Rouen Duck	8
Young Drake	8	Young Duck	7

Early in the season three to five ducks are allowed to a drake. Later in the season when running outside, eight or twelve. The drake should not be over two years of age.

Ducks lay from 100 to 140 eggs in a season. The eggs take twenty-eight days to hatch. Duck eggs are hatched by hens or ducks. They hatch well by incubator.

RATIONS.

For first three or four days, mash of cornmeal, a little hard boiled egg chopped fine, ground wheat or oats, or granulated oatmeal, the whole being mixed with boiling milk. The young birds are very fond of cabbage, lettuce or clover, which should be chopped fine and may be mixed in mash. Make mash crumbly. Skim-milk for drink.

Later on a mash may be made of cornmeal, bran and oatmeal, with chopped green stuff, and mixed with skim-milk boiled.

Feed the young ducks five times per day. Keep them in dry quarters, out of the hot sun and supply water in limited quantity in shallow dishes, so as to prevent them ducking into it.

After three or four weeks reduce the rations to four per diem. As the ducklings grow the rations may be added to by house-waste, ground bone, beef scraps or cooked meat. Small pieces of charcoal are aids to digestion.

FATTENING.

To fatten, feed on ground grain, meal, beef scraps, &c., made into a mash. Barley meal is excellent in the soft food. Nothing should be fed that will give the flesh a bad flavour.

In nine weeks the ducklings should weigh four and a half pounds each and are ready for market. They should be marketed before the pin feathers begin to grow, which is likely to occur after ninth week.

KILLING AND PICKING.

Ducks are best killed by cutting into base of brain at roof of the mouth. Before killing the feet of the birds should be caught in a loop with head hanging downwards. Immediately after being killed the picking (dry) should be done. Care should be taken to prevent injury of any kind to the carcass.

GEESE.

The best known breeds of geese, and their weights, are as follows :—

	Lbs.		Lbs.
Toulouse Gander	25	Young Gander	20
Toulouse Goose	23	Young Goose	18
Embden Gander	25	Young Gander	20
Embden Goose	25	Young Goose	18

Mating.—One gander to three females. Mate with large vigorous birds.

Management.—In spring make large comfortable nests. In most cases two clutches of eggs are laid, sometimes three. Collect the eggs soon after being laid, as they are easily chilled.

Hatching.—Some breeders who hatch geese on a large scale use incubators. Mrs. Wolcott, Napoleon, Ohio, in *Ducks and Geese*, published by the *Reliable Poultry Journal*, Quincy, Ill., says : 'I incubate their first laying with chicken hens, and frequently let "old mother goose" care for her second hatch. Be sure to have the hens, chosen for sitters, free from lice. Sprinkle the eggs with warm water twice during the last week. Oftener in dry hot weather will do no harm. Remove each gosling from the nest as it hatches, for they are easily mashed. Keep them in a flannel cloth in a basket in a good warm place until all are hatched.'

Sometimes the goslings have to be helped out of the shells.

RATIONS.

For first three days.—Similar food as that recommended for ducklings, or the following, by Mr. C. L. Darlington, Lloyd, N.Y. : cornmeal mixed with hard-boiled eggs, chopped fine, a pinch of black pepper and a handful of sand. After three days discontinue the eggs, and give bread soaked in skim or sweet milk, oatmeal, or broken rice boiled until soft, outer leaves of cabbage, onion tops, and all the grass they can eat. Keep the young birds from water, but give it to them in liberal quantities to drink.' The same authority recommends as a fattening ration a liberal supply of barley meal and cornmeal, soaked in buttermilk. A grass run is indispensable.

KILLING, PLUCKING AND DRESSING.

For local market, the goslings should be ready in twelve to fourteen weeks, and should be of large size at end of 16 weeks.

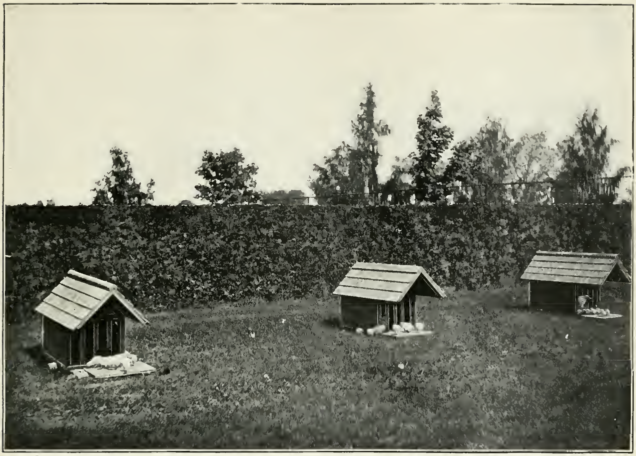
They should be killed by bleeding in the roof of the mouth, and all feathers taken off except on wing tips. For shipment and local market the geese are not drawn.

No birds less than nine pounds each should be shipped to the English market. They should be packed ten in a case.

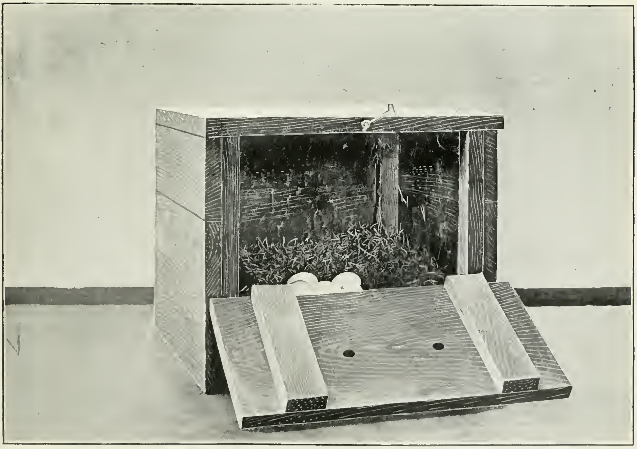
NOTES.

Goose eggs hatch in thirty to thirty-four days.

Some breeders assert that the worth of the feathers from a bird should nearly pay half the cost of its feed for one year.



Hens and chickens in outside coops on grass. Central Experimental Farm, Ottawa.



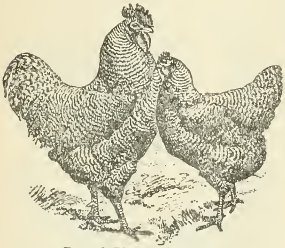
Nest-box for sitting hens. Central Experimental Farm, Ottawa.

STANDARD BREEDS

AND THEIR CHARACTERISTICS. GOOD WINTER LAYERS AND RAPID FLESH FORMERS.

PLYMOUTH ROCKS.

The different varieties of this breed may all be classed as general purpose fowls. The females are good layers and their progeny make rapid flesh formers. The different varieties are described as follows :—



Barred Plymouth Rocks.

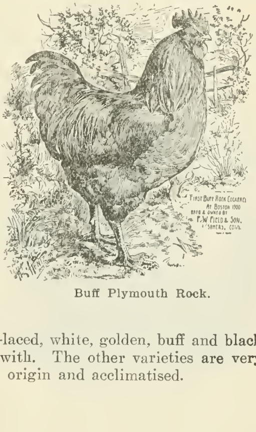
Barred Plymouth Rocks.—Natives of America. Thoroughly acclimatised females make good winter layers as pullets and one year old hens. After that age apt to put on fat, unless skilfully handled. Chickens are hardy and make, when properly fed and cared for, flesh development equal to one pound and one and a quarter pounds per month. Standard weights are as follows :—

	Lbs.
Cock..	9½
Cockerel..	8
Hen..	7½
Pullet..	6½

Pure bred birds should have yellow beaks, shanks and toes. Bright red face, comb, wattles and earlobes. Eyes clear rich bay. The plumage should be bluish gray and distinctly barred, the barring extending on the feathers to near the skin. It is permissible with the females sometimes to have a slight dark stripe down the beak.

White Plymouth Rocks.—An excellent variety of the same breed. Some strains are more robust than others. Weight and points same as the Barred, except plumage, which should be pure white.

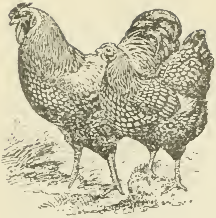
Buff Plymouth Rocks.—A comparatively new variety, but one which has rapidly come to the front on its merits. Weights and points same as others, except plumage, which should be an even shade of golden buff.



Buff Plymouth Rock.

WYANDOTTES.

Of the Wyandotte family there are the sliver-laced, white, golden, buff and black varieties. Not many of the last named are met with. The other varieties are very popular and deservedly so. They are of American origin and acclimatised.



Silver Laced Wyandottes.

Silver Laced Wyandottes.—The first and oldest variety and one possessing much merit as a layer and market fowl, as well as beauty of plumage. The hens make good winter layers, good sitters and good mothers. The chickens are hardy and make quick growth. Of late Silver Laced Wyandottes have not been so numerous as in previous years, perhaps owing to the favour with which the newer and equally good varieties have been received. Standard weight same as white variety. Colour of eggs, light brown.

White Wyandotte.

White Wyandottes.—A typical fowl for the farmer, being blocky, broad in breast, with meaty body and having a low rose comb. Hens are excellent winter layers. Chickens are hardy and make flesh development equal to that of the Barred Plymouth Rock. Great favourites with broiler raisers.

Standard weights are :

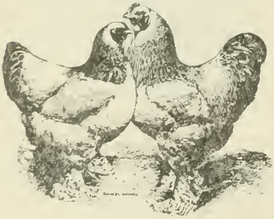
	Lbs.
Cock..	8½
Cockerel..	7½
Hen....	6½
Pullet..	5½

Distinguishing points are : Yellow beak, shanks and toes. Bright red comb, face, wattles and earlobes. Plumage and quills, pure white. Colour of egg, light brown.

Buff Wyandottes.—A new-comer and very popular. Not in such numbers yet as the whites or silver-laced. Their characteristics are very much the same as the other varieties. Standard weights the same.

ASIATICS.

The Asiatic family is composed of Light and Dark Brahmas, Buff, Partridge, White and Black Cochins and Black and White Langshans. They are of ancient origin and great favourites with fanciers and poultry breeders. They are hardy and heavily feathered. As compared with Plymouth Rocks and Wyandottes they are a little slow in putting on flesh, but when full grown make large and heavy birds.



Light Brahmas.

Light Brahmas.—A great favourite and deservedly so. The hens are layers of brown coloured eggs. Chicks are hardy and make steady growth. Hens are too heavy for early sitters, when shells of eggs are apt to be thin. They are the heaviest of the Asiatic breeds.

Standard weights are :

	Lbs.
Cock..	12
Cockerel.	10
Hen..	9½
Pullet..	8

In the thoroughbreds the following points are called for : Bright red face, comb, wattles, and earlobes ; yellow shanks and toes, and beak yellow with dark stripe down the upper mandible.

Dark Brahmas are not so numerous or well-known as the light variety. Their characteristics are much the same. The standard weights are slightly different, viz. :—

	Lbs.		Lbs.
Cocks	11	Hens	8½
Cockerels	9	Pullets	7

Buff, White, Black and Partridge Cochins.—All are well-known, the Buffs being the most numerous and best liked. They are hardy and vigorous. Hens are average layers of dark brown eggs of rich colour. Chicks are hardy and fairly rapid growers. The male of the black variety is 10½ pounds weight, half a pound lighter than the other males of that family. The standard weights are :—

	Lbs.		Lbs.
Cocks	11	Hens	8½
Cockerels	9	Pullets	7

Black Langshans.

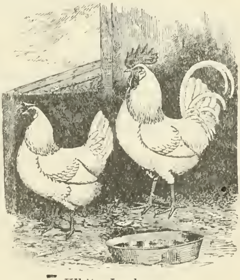
Black and White Langshans.—Of the two varieties the former are much the best known. The Black is an old and well established variety in England, where it has many friends. The females are good layers of an egg of medium size and rich brown colour. The fowls attain large size when properly handled. The chicks are hardy and grow well, but do not make as early market chicks as do the Plymouth Rocks and Wyandottes. Standard weights are :—

	Lbs.
Cocks	10
Cockerels	8
Hens	7
Pullets	6

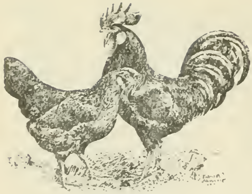
MEDITERRANEAN CLASS.

The Mediterranean class embraces the Leghorns, Andalusians and Minorcas, all non-sitters. The different points of the several varieties are given below :—

White Leghorns.—One of the best known and most popular breeds. They are veritable egg machines, as indeed are all varieties of the Leghorn family. The females of this variety are hardy and make good winter layers, when fairly well housed. Chickens are hardy and grow rapidly, the young cockerels crowing at eight weeks' of age. There are no standard weights for the varieties of this class. Eggs are white in colour. Some strains lay large white eggs. Of late the size of the White Leghorns has been increased by skilful mating. They are good fowls for farmers, when kept with a breed of sitters.



White Leghorns.



Brown Leghorns.

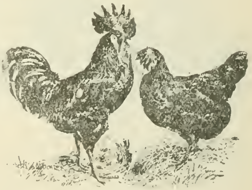
Brown Leghorns.—Another popular variety with an host of admirers. They possess all the merits of the white variety, but their eggs are slightly smaller. Colour of egg, white. Chickens, hardy and rapid growers.

Buff Leghorns.—A comparatively new, but very popular variety. They have taken a foremost position solely on their merits. The eggs of the hens are large and white in colour. Chickens are quick growers.

Black and Silver Duckwing Leghorns.—The latter is a new comer, and has yet to make friends. Neither are as popular as the other and better known varieties.

Black Minorcas.—A well-known and much appreciated breed. They have taken the place of the Black Spanish, because larger and hardier. The hens lay many large white eggs. Many of their eggs go 6 to one pound, and most of them 7 to a pound. They are good winter layers in a moderately comfortable temperature, such a temperature as all winter layers should be kept in. The chickens are hardy and make vigorous growth. Colour of eggs, white. The standard gives the Minorcas' weight as follows :—

	Lbs.
Cock	8
Cockerel	6½
Hen	6½
Pullet	5½

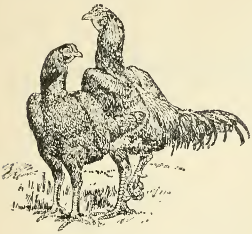


Black Minorcas.

White Minorcas.—Not nearly in such numbers as the black variety. Characteristics much the same. Eggs large and white. Excellent layers. Weights as given above.

Andalusians.—Sometimes known as blue Spanish. A well-known and popular member of the Spanish family. A prolific layer of large white eggs. They have proved themselves good winter layers, when properly fed and cared for. They are hardy. Chickens are strong and make vigorous growth. The standard weights are :—

	Lbs.		Lbs.
Cock	6½	Hen	5½
Cockerel	5½	Pullet	4½



Cornish Indian Games.

Indian Games.—This breed of Games is divided into 'Cornish' and 'White' varieties : They are popular in England on account of their value as market fowls, and for the same reason are finding favour on this side of the Atlantic. They are extensively used in England, and in many instances in this country for crossing purposes. The hens are fairly good layers of an egg of medium size. Chickens are fairly hardy and make satisfactory development. The standard weights are :—

	Lbs.
Cock......	9
Cockerel..	7½
Hen......	6½
Pullet......	5½

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

REPORT OF R. ROBERTSON, SUPERINTENDENT.

NAPPAN, N.S., November 30, 1900.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my second annual report, it being the thirteenth annual report of operations on the Experimental Farm for the Maritime Provinces at Nappan, N.S.

The season was on the whole rather wet, but not unfavourable, and fairly good crops were produced, particularly in the case of roots.

The system of rotation of crops, instituted last year, with the cultivated land at present available, which is divided into four parts, with a view of carrying on a four year rotation with manure, on one crop in each four years, and clover with as many of the other crops as possible, was again continued. The rotation practised is : 1st year, grain or sod ; 2nd year, roots with manure ; 3rd year, grain ; 4th year, clover.

As a result of this and the feeding of a greatly increased number of cattle, a very marked increase in the fertility of the farm generally is noticeable.

More stabling accommodation being necessary, a new horse-stable 66 x 30 feet was built at the south-east corner of the main barn. The former horse-stable of same size being converted into a cattle-stable and sheep-house, fitted up with box-stalls.

The cow-stable under the main barn, has also been renovated and repaired by putting a concrete floor over the whole stable, and refitting the cattle-stands and box-stalls.

A root-house, with straw barn above, was also constructed, at the north end of the main barn, 21 x 32 feet, and 10 feet high, which affords room for about 5,000 bushels.

A marked increase is noticeable in the general interest taken in agricultural and live stock matters during the past year.

During the year I have attended and addressed meetings at the following places :—

December 2—Collingwood, N.S.
" 5—Nappan, N.S.
" 27 and 30—Truro, N.S.
January 10—Elgin, N.B.
" 11—Havelock, N.B.
" 12—Jeffrey's Corner, N.B.
" 13—Sussex, N.B.
" 15—St. John, N.B.
" 18—New Glasgow, N.S.
February 5—Yarmouth, N.S.
" 6—Canning, N.S.
" 8—Shubenacadie, N.S.
" 28 and March 1 and 2—Fredericton, N.B.
March 21—Memramcook, N.B.
April 17—Hopewell, N.S.
July 11—Jacksonville, N.B.
" 11—Woodstock, N.B.
" 13—Fredericton, N.B.
" 14—St. John, N.B.
" 15—Sussex, N.B.
" 25—Truro, N.S.
" 26—Sidney, N.S.
" 28—Antigonish, N.S.
" 30—Charlottetown, P.E.I.
" 31—Kensington, P.E.I.
August 30—Wallace Bay, N.S.
November 22—Amherst, N.S.
" 23—Nappan, N.S.
" 28—Charlottetown, P.E.I

I also attended the fat stock show at Guelph, Ont., December 10 and 11.

At least the usual number of people visited the farm both as pic-nic parties and singly, the Pictou County Farmers' Association pic-nic, on August 16, being the largest gathering of the season, with many from adjoining districts, numbering some 1,200 people.

It affords me much pleasure to again state that Mr. Thos. Coates, foreman, and Mr. R. Donaldson, herdsman, have performed their work in a satisfactory manner. their assistance having been of great value to me in keeping records of uniform test plots, and of experiments with stock.

I have the honour to be, sir,
Your obedient servant,

R. ROBERTSON,
Superintendent.

WEATHER.

The winter of 1899 and 1900 was an exceptionally mild and open one, with very little snow. The thermometer registered below zero only four times : January 18, 7° below ; February 3, 6° below ; Febuary 17, 3° below, and February 27, 7° below.

December came in quite mild, with practically no frost in the ground. On the 2nd, cold weather followed, coming in mild again about the middle of the month. The remainder of December was broken, with very little snow until the last of the month, which made the first sleighing.

January opened with a snow storm on the 1st, followed by cold weather, which continued, with one exception, until the 10th, when wet weather set in and continued until the 12th. The snow was pretty well all off in places at this date, making travelling difficult. Snow, however, began to fall on the 13th. The weather continued irregular, with occasional snow falls, until the 19th, when a thaw commenced and all the snow went off. It continued mild to the 27th, then again freezing up. Slight snow fell during the next few days, but all disappeared once more, having had another rain on the 29th.

Cold weather kept on until February 5, when it moderated, and continued open until the 15th. A low temperature remained until the 23rd, when rain fell, taking off the snow that fell on the 19th, which had made three days of good sleighing. Mild weather continued until the 27th, when cold set in, keeping up until March 1.

March started moderate, with snow, followed by rain, and cold again on the 4th, which continued, with one exception, until the 9th, when mild weather and rain again followed. The 12th was cold, and the 14th was moderate, with rain, hail and snow falling in succession, and freezing up. Sleighing continued good from this date until the 17th, when a heavy warm wind took the snow all off. The remainder of the month continued moderate, with not enough snow for sleighing.

April commenced with a snow storm and wind, followed by fine mild weather. On the 7th a heavy snow storm, with wind, made it necessary to break out the roads. Sleighing was good for a few days. The remainder of April was exceptionally fine, with an occasional rain storm, but no very cold weather.

The first week in May was wet and cold The balance of May, until the 24th, was backward and broken weather, consequently seeding was late. The first seeding was done May 17, but no more again until the 26th. The season continued quite fine after May 24, and June and July were favourable to growing crops.

July was not unusually warm, but a good even temperature was maintained throughout the month. The thermometer registered 81° on the 8th ; 82° on the 9th ; 81° on the 12th, and 82°, 84° and 81° on the 23rd, 24th and 25th respectively. The rain fall during July and August, although not excessive, was continuous, except during the latter part of August, making the haying season quite unfavourable.

August continued a good even month, with no exceptionally warm days, except on the 26th and 27th, when the temperature was 83° and 84° respectively.

The first part of September was fine, but broken and wet after the middle of the month, making the harvest season backward. October was exceptionally wet, rain falling almost continuously throughout the month. This made the season for gathering the root crop very backward. The weather was mild, however, and no frost was registered until October 18, when 4° of frost were recorded. On the 20th, 9° of frost were registered, which did considerable damage to the mangel crop.

November was fairly fine with an occasional frost, and some quite heavy rain. Ploughing continued with one exception until the 25th, when the ground froze up. Snow fell on the 20th and 25th, followed by rain.

METEOROLOGICAL RECORDS.

Maximum and minimum thermometrical observations for the year beginning with December 1, 1899, and ending November 30, 1900.

Month.	Maximum.	Minimum.
1899.		
December	13th, 54° above zero	8th & 10th, 9° above zero.
1900.		
January	20th, 42° "	18th, 7° below zero.
February	5th, 43° "	27th. 7° "
March	20th, 46° "	6th, 0° "
April	22nd, 65° "	1st and 6th, 20° above zero.
May	30th, 79° "	28th, 29° "
June	25th, 77° "	4th, 31° "
July	24th, 84° "	29th, 40° "
August	27th, 84° "	13th & 24th, 42° "
September	3rd, 81° "	29th, 32° "
October	8th, 72° "	20th, 23° "
November	9th, 62° "	18th, 15° "

EXPERIMENTS WITH OATS.

The uniform test plots of oats were on land of a sandy loam character. The previous crop having been turnips was manured with thirty one-horse cart loads of stable manure, and complete fertilizer at the rate of 200 pounds per acre. The land was ploughed after the root crop was removed in the fall of 1899, and worked up the following spring by going over it twice with the spring-tooth harrow and once with the smoothing harrow.

The grain was sown on this seed bed, at the rate of 2½ bushels per acre, with the Wisner seed drill, and complete fertilizer, i.e., containing nitrogen, potash and phosphoric acid, at the rate of 100 pounds per acre was sown with the seed by means of a fertilizer attachment to the seeder. The field was seeded down to timothy and clover

at the rate of 3 pounds alsike, 7 pounds mammoth red clover and 12 pounds timothy seed per acre. This seed was sown with an attachment to the seeder at the same time the grain was sown.

The oat plots were one-fortieth acre each, sown May 17, and sixty varieties were included in the test. The crop of straw was good and stood up well, with the exception of Oderbruch, Flying Scotchman and Golden Beauty, which were badly lodged. The straw was free from rust. Smut was noted in some varieties, but the injury this caused was slight. The results obtained are given in the following table :—

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs
1	Black Beauty	Aug. 25	100	40	Medium	7	Branching	5,200	95	10	36
2	Golden Beauty	" 30	105	43	"	7	"	4,200	94	4	34
3	Wallis	" 30	105	40	Stiff	7	"	5,000	92	32	38
4	Holstein Prolific	" 29	104	42	Medium	8	"	4,000	91	26	39
5	Joanette	" 25	100	38	Stiff	7	"	5,080	91	26	38
6	Danish Island	" 23	98	43	Medium	7	"	5,200	90	20	37
7	Buckbee's Illinois	" 28	103	40	"	7	"	4,600	90	20	39
8	Lincoln	" 31	106	44	"	8	"	5,200	89	14	36½
9	Black Mesdag	" 17	92	42	Stiff	9	"	6,000	88	8	38
10	Wide Awake	" 30	105	46	"	7½	"	6,200	88	8	39
11	Bonanza	" 27	102	42	Medium	7	"	4,600	88	8	38
12	Bavarian	" 28	103	42	Stiff	7	"	4,600	87	2	36
13	Cromwell	Sept. 10	116	42	"	8	Sided	6,000	87	2	35
14	Kendal	Aug. 29	104	43	"	7	"	5,600	87	2	38
15	Early Maine	" 30	105	40	Medium	7	Branching	3,800	85	30	36
16	California Pro., Blk. Imp.	" 28	103	42	Stiff	7½	Sided	4,600	85	30	38
17	Early Blossom	" 27	102	44	"	8	"	5,200	85	30	38
18	Thousand Dollar	" 27	102	43	"	7	Branching	4,200	84	24	42
19	Golden Giant	" 30	105	40	"	7	"	3,600	84	24	36
20	Newmarket	" 30	105	43	Medium	7	"	3,800	83	18	39
21	White Schonen	" 25	100	38	Stiff	7	"	4,600	82	12	37
22	Rosedale	" 28	103	42	"	7	Sided	5,000	80	..	39
23	Improved American	" 28	103	40	"	7	Branching	4,400	80	..	37
24	Early Golden Prolific	" 28	103	45	Medium	7	"	4,600	80	..	39
25	Improved Ligowo, Imp.	" 27	102	42	Stiff	7	"	4,600	77	22	39
26	Cream Egyptian	" 23	98	44	"	10	Sided	3,800	76	16	40
27	Early Archangel	" 23	98	40	"	8	Branching	4,600	76	16	40
28	Brandon	" 28	103	42	Medium	8	"	4,200	76	16	41
29	California Prolific, Black	" 28	103	43	Stiff	7½	Sided	4,600	76	16	40
30	Hazlett's Seizure	" 30	105	42	Medium	8	Branching	3,400	76	16	41
31	White Russian	" 27	102	44	Stiff	7	"	4,000	75	10	39
32	Flying Scotchman	" 29	104	42	Weak	7	"	4,400	75	10	41
33	Oderbruch	" 28	103	46	Medium	7½	Sided	5,200	75	10	38
34	Improved Ligowo	" 27	102	42	Stiff	7	Branching	3,800	74	4	39½
35	Banner	" 25	100	42	"	7	"	4,200	74	4	39
36	Salines	Sept. 3	109	43	"	8	"	4,800	74	4	36
37	Mennonite	Aug. 30	105	38	Medium	7	"	3,200	74	4	38
38	Sensation	" 24	99	40	Stiff	7	"	3,400	72	32	39
39	Pense	" 29	104	42	"	8	Sided	4,480	72	32	38
40	Black Tartarian, Imp	" 27	102	37	"	7	"	3,800	70	20	37
41	American Beauty	" 27	102	41	"	6	Branching	3,800	70	20	39
42	American Triumph	" 28	103	46	"	9	"	5,280	70	20	39
43	Siberian O. A. C.	" 28	103	39	"	7	"	4,800	70	20	38
44	Master	" 30	105	40	Medium	7	"	4,200	70	20	38
45	Early Gothland	" 24	99	42	Stiff	7	Sided	4,600	69	18	41
46	Abyssinia	" 27	102	42	"	7	"	4,800	69	18	41
47	Abundance	" 27	102	42	"	7	Branching	3,400	68	8	38
48	Salzer's Big 4	" 28	103	40	"	6	"	3,800	68	8	37
49	Milford	" 30	105	42	"	7	Sided	3,800	68	8	39
50	Holland	" 25	100	44	Medium	8	Branching	4,680	68	8	38

OATS—TEST OF VARIETIES—*Concluded.*

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs
51	Golden Tartarian........	Sept. 10..	116	48	Stiff	8	Sided.......	5,200	68	8	34
52	Black Tartarian..........	Aug. 27..	102	38	"	7	"	4,600	67	2	38
53	Olive....................	" 30..	105	46	"	8	"	3,200	67	2	38
54	New Zealand...........	Sept. 10..	116	41	Medium....	8	"	5,600	67	2	36
55	Russell..................	" 4..	110	45	Stiff	8	Branching..	4,400	63	18	37½
56	Columbus...............	Aug. 30..	105	42	Medium. ..	7	" ..	3,200	62	12	36
57	King........	" 28..	103	46	"	7½	" ..	3,400	62	12	37
58	Oxford	Sept. 4..	110	44	Stiff	8	" ..	2,680	62	12	39
59	White Giant............	" 10.	116	44	"	8	Sided.......	4,080	62	12	35½
60	Miller..................	Aug. 29..	104	47	Medium. ..	8	Branching..	3,480	60	..	35

EXPERIMENTS TO PREVENT SMUT IN OATS.

Experiments were again conducted this year to determine the value of Formalin and Massel powder as preventives of smut in oats. A sample of very smutty grain was used and treated in six different ways. A check plot was also sown which received no treatment whatever. The seed was sown June 14, and the grain cut September 15. The plot was 33 by 3 feet. The table below gives the number of heads free from smut and the number affected :

OATS TREATED FOR SMUT.

Name of Variety.	How Treated.	Materials Used.	Good Heads.	Smutty Heads.
Flying Scotchman	Soaked, 1 hour..........	Formalin 4½ oz. to 10 galls. water..	3,450	None.
" "	" 15 minutes.......	" " " ..	2,610	None.
" "	" 5 "	" " " ..	2,736	90
" "	Sprinkled	" " " ..	2,520	None.
" "	"	Formalin 9 oz. to 10 galls. water....	2,640	None.
" "	"	Massel powder	2,484	186
" "	Check..	Not treated	2,112	432

EXPERIMENTS WITH BARLEY.

The soil of these plots was a clay loam. The previous crop was mangels, having received 30 one-horse cartloads of stable manure per acre with bone meal, fertilizer, and salt at the rate of 200 pounds each per acre. The land was ploughed after this crop was removed in the fall of 1899, and in the following spring worked up by going over it twice with the spring-tooth and once with the smoothing harrow.

The grain was sown at the rate of 2 bushels per acre. The land was seeded down to timothy and clover at the rate of 3 pounds Alsike, 7 pounds Mammoth Red Clover and 12 pounds Timothy seed per acre. Complete fertilizer at the rate of 100 pounds per acre was also sown with the grain.

The crop of straw was good, and with the exception of French Chevalier and Kinver Chevalier, stood up well. The straw was free from rust. Some plots had smut in them, but in every instance the injury from this cause was slight.

The seed was sown May 30, on one-fortieth acre plots. There were twenty-nine varieties of six-rowed, and nineteen of two-rowed sorts in this test. The variety Hulless White started with very weak growth and failed to be worth harvesting.

BARLEY. SIX ROWED—TEST OF VARIETIES.

No.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw per acre.	Yield per acre.		Weight per Bushel.
				Inches.		Inches.	Lbs.	Bus.	Lbs.	Lbs.
1	Mensury	Aug. 30	92	40	Medium	2½	6,000	60	..	48
2	Trooper	" 25	87	38	Stiff	2½	5,200	57	24	48½
3	Albert	" 25	87	42	Medium	3	5,600	57	24	47
4	Royal	" 24	86	32	"	2½	5,200	56	32	47
5	Surprise	" 31	93	33	Stiff	2	4,600	54	80	49
6	Yale	" 30	92	36	"	2½	4,000	53	16	47
7	Common	" 25	87	40	Medium	2¼	4,400	53	16	48
8	Rennie's Improved	" 25	87	41	Stiff	2½	3.800	52	24	49
9	Petschora	" 24	86	40	Medium	2½	3,000	52	24	47
10	Phœnix	" 25	87	40	Stiff	2½	4,000	52	24	47
11	Odessa	" 25	87	38	Medium	2½	4,600	51	32	48
12	Mansfield	" 31	93	38	"	2½	4,200	50	..	47
13	Champion	" 24	86	44	"	2½	5,200	50	40	45
14	Baxter	" 25	87	40	Stiff	2½	3,800	47	24	48
15	Stella	" 31	93	33	"	2	4.200	47	24	48
16	Pioneer	" 24	86	32	"	2½	4,000	45	40	49
17	Garfield	" 30	92	37	"	2½	3,800	43	16	48
18	Oderbruch	" 25	87	36	Medium	2½	3,000	42	24	47½
19	Excelsior	" 25	87	42	Stiff	3	3,600	40	..	40
20	Vanguard	" 25	87	37	"	2½	2,800	40	..	47
21	Summit	" 31	93	33	"	2	3,880	40	..	48½
22	Argyle	" 27	89	40	"	3	2,680	40	..	47
23	Nugent	" 30	92	34	"	2¼	4,280	40	..	48½
24	Empire	" 31	93	34	Medium	3	2,920	36	32	48
25	Success	" 24	86	35	"	2½	3,200	33	16	42
26	Brome	" 31	93	32	"	2½	2,600	32	40	48
27	Claude	" 31	93	30	"	2	2,600	29	8	47½
28	Blue Long Head	" 31	93	30	"	2½	2,600	25	..	42
29	Hulless Black	" 25	87	30	Weak	2	2,200	20	40	60

BARLEY, TWO-ROWED—TEST OF VARIETIES.

1	Beaver	Aug. 30	92	36	Medium	3	5,800	65		51
2	Danish Chevalier	" 31	93	34	Weak	3	4,800	63	16	50½
3	Canadian Thorpe	" 31	93	40	Stiff	3	5,400	58	16	49
4	French Chevalier	Sept. 1	94	40	Medium	3½	4,680	55		51
5	Thanet	Aug. 31	93	38	Stiff	2½	4,600	55		50
6	Bolton	" 30	92	36	Medium	4	4,200	50		51
7	Newton	" 31	93	34	Stiff	2½	3,080	47	24	50
8	Prize Prolific	Sept. 1	94	38	Medium	4	4,600	46	32	50½
9	Clifford	Aug. 31	93	38	"	3	4,600	45		49
10	Dunham	Sept. 1	94	40	Stiff	3	4,000	44	8	49
11	Sidney	" 1	94	40	"	3	4,000	42	24	49½
12	Harvey	" 1	94	40	"	3	3,280	40	40	48
13	Kinver Chevalier	" 1	94	40	Medium	4	3,600	40		48½
14	Nepean	Aug. 30	92	38	Stiff	3	4,600	40		49½
15	Logan	" 31	93	40	Medium	3	3,600	39	8	48½
16	Fulton	Sept. 1	94	38	Stiff	2½	3,600	32	24	48
17	Victor	" 1	94	38	"	3	2,600	28	16	50
18	Jarvis	" 1	94	38	"	2½	3,480	25	40	49
19	Lesne	Aug. 31	93	38	"	2½	2,680	25		50

EXPERIMENTS TO PREVENT SMUT IN BARLEY.

To determine the value of Formalin and Massel powder, as preventives of smut in barley, grain of two varieties was again treated this year in six different ways. A check plot untreated was also sown. The size of each plot was 33 by 3 feet. The grain was sown June 14, and harvested September 15. The number of smutty heads and those free from smut in each plot is given in the following table :—

Barley Treated for Smut.

Name of Variety.	How Treated.	Material used.	Good Heads.	Smutty Heads.
Canadian Thorpe, 2-rowed	Soaked, 1 hour.....	Formalin $4\frac{1}{2}$ oz. to 10 galls. water.	3,726	0
" " .	" 15 minutes..	" " "	3,672	6
" " .	" 5 " ..	" " " .	3,108	12
" " .	Sprinkled.	" " " .	3,738	48
" " .	"	" 9 oz. to 10 galls. water.	4,272	6
" " .	"	Massel powder..........	4,770	72
" " .	Check	Not treated......................	4,812	390
Odessa, 6-rowed	Soaked, 1 hour......	Formalin $4\frac{1}{2}$ oz. to 10 galls. water.	3,378	72
" "	" 15 minutes..	" " " .	3,702	114
" "	" 5 " ..	" " " .	3,120	6
" "	Sprinkled...........	" " " .	3,672	126
" "	"	" 9 oz. to 10 galls. water.	4,860	114
" "	"	Massel powder..................	2,618	132
" "	Check	Not treated.	3,972	84

EXPERIMENTS WITH SPRING WHEAT.

Fifty varieties of wheat were sown on May 26, in plots of one-fortieth of an acre each. The soil was a clay loam. The previous crop was mangels, having received thirty one-horse cartloads of stable manure per acre, and complete fertilizer, bone meal, and salt, at the rate of 200 pounds each per acre. The land was ploughed in the fall of 1899. after the crop was removed, and in the following spring was worked up by going over it twice with the spring-tooth and once with the smoothing harrow.

The land was seeded down when sowing the barley to clover and timothy, at the rate of 3 pounds Alsike, 7 pounds Mammoth Red Clover, and 12 pounds Timothy seed per acre. Complete fertilizer, at the rate of 100 pounds per acre, was sown with the grain.

The straw was stiff, and some rust was noted. The seed was sown at the rate of $1\frac{3}{4}$ bushels per acre :—

WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	lbs.	Lbs	
1	Laurel	Sept. 8.	105	43	Medium	3	Beardless.	5,000	44	40	58½	Slightly.
2	Speltz	〃 8.	105	34	〃	2	Bearded	4,280	44	40	40	〃
3	White Connell	〃 8.	105	42	Stiff	3	Beardless.	5,600	44	..	60	〃
4	White Fife	〃 10.	107	42	〃	3	〃	5,400	42	.	59	〃
5	Hungarian	〃 7.	104	39	Medium	2½	Bearded	5,000	41	20	59	〃
6	Red Fern	〃 6.	103	44	Stiff	3½	〃	5,000	40	40	60	〃
7	Weldon	〃 8.	105	44	〃	3	Beardless.	4,800	40	40	60	〃
8	White Russian	〃 10.	107	43	〃	3½	〃	5,200	40	40	60	Very slig'tly
9	Red Swedish	〃 8.	105	45	Medium	3	Bearded	5,200	40	40	59½	Slightly.
10	Colorado	〃 6.	103	44	Stiff	3	Beardless.	4,600	40	.	61½	〃
11	Rio Grande	〃 7.	104	45	〃	3	〃	5,000	40	..	59	〃
12	Pringle's Champlain	〃 7.	104	44	Medium	3	Bearded	5,000	38	40	60½	〃
13	Preston	〃 6.	103	42	Stiff	3	〃	4,200	38	40	61	〃
14	Norval	〃 5.	102	38	Medium	2½	〃	3,000	38	..	60	〃
15	Alpha	〃 8.	105	44	Stiff	3	〃	5,000	38	..	59	〃
16	Percy	〃 7.	104	45	〃	3	Beardless.	5,080	37	20	60	〃
17	Clyde	〃 8	105	43	〃	3	〃	4,480	37	20	59	〃
18	Roumanian	〃 7.	104	43	〃	2¼	Bearded	4,200	36	40	60	〃
19	Dion's	〃 8.	105	44	〃	3½	〃	4,000	36	40	60	Very slig'tly
20	Advance	〃 7.	104	44	〃	3	〃	4,600	36	40	60	Slightly.
21	Red Fife	〃 8.	105	42	〃	3½	Beardless.	5,080	36	40	59	〃
22	Monarch	〃 8.	105	42	〃	3	〃	4,400	36	40	59	〃
23	Beaudry	〃 8.	105	40	Weak	2½	Bearded	3,200	36	..	60	〃
24	Plumper	〃 5.	102	41	Medium	2½	〃	4,600	36	..	61	〃
25	Mason	〃 8.	105	40	Stiff	2½	Beardless.	3,600	35	20	59	〃
26	Ladoga	〃 1.	98	46	Medium	2½	Bearded	4,400	35	20	60½	〃
27	Campbell's Wh'e Chaff	〃 8.	105	40	Stiff	3	Beardless.	4,000	34	40	59	〃
28	Dawn	〃 6.	103	45	〃	3	〃	4,800	34	..	60	〃
29	Huron	〃 8.	105	40	〃	2½	Bearded	3,400	34	.	60	〃
30	Goose	〃 6.	103	38	Medium	2½	〃	3,400	34	.	61½	〃
31	Blair	〃 8.	105	40	〃	2½	Beardless.	2,600	34	.	60	Medium.
32	Wellman's Fife	〃 10.	107	46	Stiff	3¼	〃	5,000	34	..	59	Very slig'tly
33	Dufferin	〃 3.	100	40	Medium	2½	Bearded	3,080	33	20	60	Slightly.
34	Vernon	〃 4.	101	43	Stiff	3	〃	4,000	33	20	60	〃
35	Stanley	〃 5.	102	42	〃	3	Beardless.	3,600	33	20	60	〃
36	Progress	〃 8.	105	40	Medium	2½	〃	3,000	33	20	59½	Badly.
37	Herisson Bearded	〃 8.	105	37	Weak	2	Bearded	3,200	33	20	59	〃
38	Admiral	〃 7.	104	45	Stiff	3	Beardless	4,600	33	20	58	Slightly
39	Beauty	〃 8.	105	40	Medium	3	〃	3,600	31	20	58	〃
40	Blenheim	〃 8.	105	42	Stiff	3	Bearded	3,600	31	20	59	〃
41	Captor	〃 8	105	42	〃	3	Beardless.	3,400	28	..	58	〃
42	Crawford	〃 5.	102	40	Medium	3	〃	3,000	28	..	61	Badly.
43	Byron	〃 5	102	36	〃	3	Bearded	3,400	28	..	61	Slightly.
44	Early Riga	〃 1	98	46	〃	2½	Beardless.	3,600	28	..	59	〃
45	Crown	〃 8.	105	42	Stiff	3	Bearded	3,400	27	20	59	〃
46	Harold	〃 8.	105	38	Medium	2½	〃	3,200	24	40	60	Badly.
47	Rideau	〃 4.	101	38	〃	2½	Beardless.	3,400	24	..	58	〃
48	Ebert	〃 8.	105	40	〃	2½	〃	3,400	24	.	57	〃
49	Fraser	〃 4.	101	38	〃	2½	Bearded	3,200	22	..	60	Slightly.
50	Countess	〃 8	105	38	〃	2½	Beardless	3,200	20	40	58	〃

EXPERIMENTS WITH PEASE.

The plots of pease were on sandy loam. The previous crop having been turnips, was manured with thirty one-horse cartloads of manure, and complete fertilizer, at the rate of 200 pounds per acre. The land was ploughed after the root crop was removed in the fall of 1899, and the following spring worked up by going over it twice with the spring-tooth, and once with the smoothing harrow.

The seed was sown May 28, in one-fortieth acre plots. Complete fertilizer, at the rate of 100 pounds per acre, was drilled in with the seed. Timothy and clover, at the rate of 7 pounds Mammoth Red, 3 pounds Alsike Clover, and 12 pounds of Timothy seed per acre, was also sown.

The growth gave evidence of being a fine crop, but, as was the case last year, the crop was greatly damaged by the pea aphis *Nectarophora destructor*, which infested

the crop about the first of August. After the middle of August, without any known cause, this pest seemed to greatly lessen, and the damage was not as great as that reported last year.

Fifty-eight varieties were grown. The variety called Grass Pea failed to ripen any seed, and consequently is not included in the table which gives the results obtained from these tests :—

PEASE—TEST OF VARIETIES.

No.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Lenght of Straw.	Weight of Straw Per acre.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	Lbs.	In.		Bus.	Lbs.	Lbs.
1	Crown	Sept. 6	101	Strong	41	3,600	2	Small	29	20	60½
2	Nelson	" 6	101	Medium	40	3,000	2½	Medium	28	40	60
3	Oddfellow	" 5	100	Weak	36	3,400	1½	"	26	40	63
4	Elephant Blue	" 7	102	"	34	2,800	2	Small	26	40	60
5	Perth	" 6	101	Medium	40	3,000	2½	Large	24	40	61
6	Centennial	" 5	100	"	36	2,800	2	Small	23	20	60
7	Chancellor	" 7	102	"	35	2,600	2	"	22	40	61
8	French Canner	" 7	102	Strong	40	3,000	2	"	22	40	60
9	Elliot	" 11	106	"	42	3,200	3	Large	22	40	61
10	Black Eyed Marrowfat	" 7	102	"	44	2,600	2½	"	22	40	60
11	Mummy	" 5	100	Medium	36	3,000	2	Small	22	..	62
12	Multiplier	" 7	102	Strong	40	2,600	2	"	22	.	61
13	Agnes	" 6	101	"	42	2,800	2	Medium	22	..	59
14	English Grey	" 8	103	Medium	40	2,600	2	"	21	20	60
15	Alma	" 6	101	Strong	42	2,800	2	"	21	20	60
16	Carleton	" 7	102	"	42	2,600	3	Small	21	20	61
17	Archer	" 7	102	Medium	40	3,400	2	"	21	20	60½
18	Arthur	" 5	100	"	35	1,800	2	Medium	20	40	62
19	White Wonder	" 5	100	"	36	2,080	2	"	20	40	60
20	Daniel O'Rourke	" 7	102	Strong	44	3,080	2	"	20	40	60
21	Eureka	" 7	102	Medium	36	3,600	2¼	"	20	40	61½
22	New Potter	" 6	101	Strong	44	3,600	2½	"	20	..	60½
23	Cooper	" 6	101	Medium	40	2,600	2½	"	19	20	60
24	Paragon	" 11	106	"	36	3,000	2½	"	18	40	60
25	Pride	" 6	101	Strong	42	3,000	2½	"	18	40	61
26	Harrison's Glory	" 6	101	Weak	35	2,000	2	Small	18	..	62
27	German White	" 6	101	Medium	34	1,600	2½	Large	18	..	60
28	Lanark	" 6	101	Weak	33	1,800	2½	Medium	18	..	60
29	Picton	" 6	101	Strong	40	2,200	2	"	18	.	60
30	Mackay	" 10	105	"	44	2,400	3	Large	17	20	60
31	Duke	" 11	106	"	44	3,000	2	Medium	17	20	60
32	Bedford	" 11	106	"	42	2,400	2¼	"	17	20	60
33	Bright	" 6	101	"	40	1,880	2¼	Large	16	40	62
34	Early Britain	" 5	100	Medium	36	1,400	2	"	16	..	59
35	King	" 7	102	"	34	2,000	2	Medium	16	.	61
36	Creeper	" 7	102	Strong	40	3,000	2	Small	15	20	59
37	Trilby	" 10	105	"	42	2,600	2½	Medium	15	20	61
38	Canadian Beauty	" 7	102	Medium	38	1,400	2	"	15	20	62
39	Vincent	" 6	101	"	34	1,800	2½	"	15	20	62
40	Elder	" 10	105	"	36	2,600	2	Small	15	20	59
41	Prince	" 6	101	Weak	33	1,400	2¼	Medium	14	..	61½
42	Golden Vine	" 6	101	Medium	36	1,800	2	Small	13	20	61
43	Kent	" 6	101	"	36	2,000	2½	Medium	13	20	61
44	Bruce	" 10	105	Strong	44	2,200	2	"	13	20	60
45	Fenton	" 7	102	"	40	2,000	2½	"	13	20	60
46	Wisconsin Blue	" 6	101	Weak	30	1,800	2	Small	12	40	61
47	Prince Albert	" 6	101	Strong	42	1,600	2	"	12	..	60
48	Dover	" 7	102	"	46	3,000	2½	Large	12	..	60½
49	Macoun	" 10	105	"	42	1,400	2½	Medium	12	..	61
50	Chelsea	" 7	102	Medium	36	1,800	2	Small	11	20	60
51	Prussian Blue	" 6	101	"	36	1,800	2	"	10	..	62
52	Gregory	" 6	101	Weak	34	1,800	2	"	10	..	61
53	Harold	" 6	101	Medium	36	1,680	2	"	10	..	60
54	Fergus	" 8	103	"	36	1,400	2	"	10	..	60
55	Large White Marrowfat	" 6	101	Strong	40	1,400	2½	Large	10	..	61
56	Pearl	" 11	106	"	46	1,800	2½	Medium	10	..	58
57	Victoria	" 7	102	"	44	1,400	2¼	"	6	40	61

EXPERIMENTS WITH FIELD GRAIN.

In order to determine the relative yield of mixed grain as compared with single varieties, plots of one acre each were laid out on a field of as uniform a character as possible. This land was a light loam, of poor quality, the only manure used for many years being a crop of peas ploughed under green in 1899. This crop was ploughed under in September as green manure. The land was again ploughed late in the fall to a uniform depth of 6 inches.

This was worked up in the spring with the disc, spring-tooth and smoothing harrows, each going over it once. Complete fertilizer at the rate of 100 pounds per acre was drilled in with the grain. One acre of mixed grain was also sown without fertilizer to determine the increased yield from the small quantity of fertilizer used.

Five acres of land similar in character, and having had similar treatment to the above, were also sown with mixed grain and fertilized as above.

The seed was sown June 11, at the rate of 3 bushels per acre. The mixed grain was in the proportion of 2 bushels oats, 1 bushel barley, and ½ bushel peas. The yield per acre obtained from this field is as follows :—

	Bush.	Lbs.
1 acre oats (Imported Irish)	31	10
1 " (Rosedale)	33	8
1 " (Banner)	35	26
1 acre mixed grain	36	6
1 " (not fertilized)	30	6
5 " (fertilized)	37	..

FIELD CROPS OF MIXED GRAIN.

To find out the gain, if any, of seeding heavy, an experiment was conducted on plots of one acre each with mixed grain. The grain was mixed in the same proportion as that sown on the above field. This field had as a previous crop mixed grain, this being the first time the land had been ploughed for many years, never having been manured.

The field was ploughed in the fall of 1899 to an average depth of 6 inches, and in the spring was once worked with the disc, spring-tooth and smoothing harrows. Complete fertilizer at the rate of 200 pounds per acre was drilled in with the grain. The grain was sown June 8.

Two acres were marsh mudded at the rate of 90 tons per acre, and one acre of this was left without fertilizer, the other being fertilized at the rate of 100 pounds per acre. The following yields were obtained from the five acres :—

	Bush.	Lbs.
1 acre, 2 bushels seed sown per acre	30	12
1 " 2½ " "	36	24
3 " 3 " "	39	8
1 " 3 " " mudded and fertilized	43	12
1 " 3 bushels seed sown per acre, mudded and no fertilizer used	40	

FIELD CROPS OF OATS ON MARSH.

Five acres of marsh was ploughed in the fall of 1899, and in the spring it was worked up with the spade and spring-tooth harrows. It was sown by hand at the rate of 3½ bushels per acre. Banner oats were used.

Clover and timothy were sown at the same time at the rate of 3 pounds alsike and 7 pounds Mammoth red clover, with 12 pounds of timothy seed per acre. The land was harrowed once with the spring-tooth harrow after the grain was sown, and once with the smoothing harrow after the grass-seed was sown. No fertilizer of any kind was used. The yield per acre was 53 bushels 15 pounds.

EXPERIMENTS WITH BUCKWHEAT.

The land on which this grain was grown was a clay loam. The previous crop was mangels, having received 30 one-horse cart loads of stable manure per acre, and complete fertilizer at the rate of 200 pounds per acre. The land was ploughed after this crop was removed in the fall of 1899, and in the spring was worked up twice with the spring-tooth harrow and once with the smoothing harrow.

The seed was sown June 16 in one-fortieth acre plots, and complete fertilizer at the rate of 100 pounds per acre was drilled in with the seeder. The following yields were obtained from the five varieties under test :—

BUCKWHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
				Inches.		Lbs.	Bush.	Lbs.	Lbs.
1	Silverhull.	Sept. 4	83	43	Stiff	5,000	49	8	52
2	Japanese	" 5	84	44	"	5,800	48	16	48
3	Rye	" 5	84	45	"	4,600	45	40	52
4	Tartarian or Siberian	" 4	83	42	"	4,000	41	32	50
5	Grey	" 4	83	44	"	5,000	38	16	49

FIELD CROPS OF BUCKWHEAT.

Five acres of buckwheat was grown on land which had pease as a previous crop, this crop being ploughed under as a green manure in September, 1899. The land previous to that being exceptionally poor, never having had any manure applied. It was again ploughed in the late fall of 1899. In the spring the field was worked up and seeded June 21, one-half being fertilized with 200 pounds of Albert Thomas' Phosphate per acre, and the other $2\frac{1}{2}$ acres received no fertilizer of any kind. The yield obtained is as follows :—

	Bush.	Lbs.
$2\frac{1}{2}$ acres fertilized	34	10
$2\frac{1}{2}$ acres not fertilized	21	19

Five acres of new land was also seeded to buckwheat, it being in buckwheat the previous year. No fertilizer was applied to this land. The yield was at the rate of 19 bushels per acre.

EXPERIMENTS WITH CORN.

The soil on which the corn was grown is a light clay loam. It was manured on the sod in the early spring with twenty-five one-horse cartloads of stable manure per acre. The previous crop was clover and timothy. The manure, together with a good growth of grass, was ploughed under June 5. The ground was then worked up by going over it once each with the spring-tooth, disc, and smoothing harrows.

Shallow marks were made 3 feet apart, and complete fertilizer, at the rate of 200 pounds per acre, was scattered along, the seed dropped and all lightly covered. Duplicate plots were sown in hills 3 feet apart. The same quantity of fertilizer as the above was used per acre, the seed dropped, and both covered lightly.

The season was fairly favourable, but rather wet, with the exception of a period during the latter part of August, and beginning of September, when splendid growth was made, and many of the varieties matured quite sufficiently for good ensilage. Owing to the other farm work being backward, on account of broken weather, the corn crop was harvested late, but it was noticeable that the crop matured very little during the last two weeks, it being both wet and cold.

Thirty-two varieties were sown June 7. The crop was cut October 8, not having sustained any frost The yield per acre is calculated from two rows, each 66 feet long :—

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	Leafiness.	When Tassell-ed.	In Silk.	Condition When Cut.	Weight per Acre Grown in Rows.		Weight per Acre Grown in Hills.	
		Inches.					Tons.	Lbs.	Tons.	Lbs.
1	Rural Thorobred White Flint	106	Medium.	Sept. 15	......	Silked	28	750	27	1,550
2	Champion White Pearl	108	"	" 12	....	"	27	1,550	27	1,000
3	Superior Fodder	98	"	" 15	....	Early milk	26	1,900	23	200
4	Cloud's Early Yellow	105	"	" 3	Sept. 18	"	25	600	25	1,150
5	Mammoth Cuban	96	"	" 1	" 15	"	24	1,500	26	1,350
6	North Dakota White	165	Very.	Aug. 21	" 3	"	24	950	23	750
7	Pride of the North	98	Medium.	Sept. 10	" 17	"	24	950	22	550
8	Red Cob Ensilage	90	"	" 15	....	Silked	24	70	25	1,150
9	Early Butler	94	"	" 1	Sept. 18	Early milk	23	1,850	20	1,250
10	Early Mastodon	104	"	" 6	....	No ears	23	1,850	22	550
11	Giant Prolific Ensilage	100	"	" 15	....	Silked	23	970	20	150
12	King of the Earliest	108	"	" 15	....	Early milk	23	970	19	1,050
13	Angel of Midnight	90	Very.	Aug. 21	Sept. 1	Glazed	25	750	19	1,600
14	Selected Leaming	108	Medium.	" 25	" 5	Early milk	23	420	21	350
15	White Cap Yellow Dent	104	"	Sept. 1	....	"	22	1,650	21	50
16	Evergreen Sugar	103	"	" 3	......	"	22	1,100	20	700
17	Canada White Flint	98	Very.	Aug. 25	Sept. 1	"	22	550	21	350
18	Country Gentleman	98	Medium.	Sept. 1	....	Silked	22	550	20	1,800
19	Mammoth 8 Rowed Flint	100	"	Aug. 23	Sept. 3	Soft glazed	21	1,670	21	1,450
20	Longfellow	90	Very.	" 20	" 1	Glazed	21	1,670	21	1,450
21	Pearce's Prolific	96	"	" 20	" 1	"	20	1,800	21	350
22	Sanford	90	"	" 23	" 15	Late milk	20	1,550	22	....
23	Early August	85	Medium.	Sept. 1	....	Silked	20	1.250	20	1,250
24	Salzer's All Gold	90	"	" 1	....	"	20	.....	18	1,400
25	Kendall's Early Giant	85	"	Aug. 20	Sept. 5	Late milk	19	1,600	16	1,550
26	Extra Early Huron Dent	104	"	" 23	" 8	Soft glazed	19	500	15	1,900
27	Compton's Early	88	Very.	" 20	" 1	Glazed	18	1,950	17	1,750
28	Mitchell's Extra Early	66	"	" 13	Aug. 23	"	13	950	14	50
29	Extra Early Szekely	84	"	" 15	" 24	"	13	950	11	1,650
30	Yellow Six Weeks	72	"	" 13	" 20	"	11	1,870	10	1,250
31	Yellow Dakota	64	"	" 13	" 23	"	11	.....	11	1,100
32	Salzer's Earliest	90	"	Sept. 1	Sept. 15	Soft glazed	9	700	8	500

EXPERIMENTS WITH SORGHUM AND BROOM CORN.

One variety each of Sorghum and Broom Corn were sown June 7. The land was a light clay loam, similar to that on which the other corn was grown, having received the same treatment as the corn plots, being on adjoining land.

The seed was sown in rows 3 feet apart, and complete fertilizer, at the rate of 200 pounds per acre, applied. The crop was cut October 8, and the following yield was obtained, calculated from two rows, each 66 feet long:—

	Yield per acre. Tons.	Lbs.
Early Amber Sugar Cane	8	650
Broom Corn	9	230

CORN SOWN IN ROWS AT DIFFERENT DISTANCES.

The experiments carried on last year with three varieties of corn, Champion White Pearl, Longfellow and Selected Leaming, by sowing the rows at different distances apart, to find out which distance will give the largest yield per acre, were this year continued.

The land on which these were grown was the previous year in pease, having been ploughed in the fall of 1899, and manured and worked up the following spring. Stable manure, at the rate of thirty one-horse cartloads per acre, was spread and ploughed under. The ground was worked up, and the seed sown with the seed drill June 13. The crop was cut and weighed October 4. The yield per acre was calculated from a plot of one-fortieth acre, as follows :—

CORN AT DIFFERENT DISTANCES APART.

Name of Variety.	Distances.	Yield per Acre.	
	Inches.	Tons.	Lbs.
Longfellow	21	21	1,240
"	28	18	1,275
"	35	18	1,620
"	42	15	1,200
Selected Leaming	21	18	1,600
"	28	15	1,950
"	35	15	495
"	42	15	
Champion White Pearl	21	20	1,360
" "	28	16	1,725
" "	35	16	1,915
" "	42	15	576

FIELD CROPS OF CORN.

The land on which the field corn was grown was similar, and received the same treatment, as that on which the uniform test plots were grown, being a continuation of the same field. It received twenty-five one-horse cartloads of barn-yarn manure, and 200 pounds of complete fertilizer per acre. The corn was sown in rows 3 feet apart, with the seed drill, and the fertilizer was drilled in by allowing the fertilizer attachment to run when sowing the corn.

The seed was sown June 8. Two varieties were grown in one-half acre plots, and five varieties in one-quarter acre plots. The following table gives the yields per acre, and the condition of the crop when cut :—

FIELD CORN.

Name of Variety.	Yield per Acre.		Condition when Cut.
½-Acre Plots.	Tons.	Lbs.	
Longfellow	21	500	Glazed.
Red Cob Ensilage	20	1,930	Early milk.
¼-Acre Plots.			
Compton's Early	17	1,740	Glazed.
Extra Early Huron	17	700	Soft glazed.
Cloud's Early Yellow	18	1,500	Early milk.
Angel of Midnight	22	300	Glazed.
Canada White Flint	23	1,000	Early milk

EXPERIMENTS WITH TURNIPS.

The soil of these plots was a clay loam. The previous crop was oats, and the Mammoth Red Clover sown with this crop made a good mat to plough under. In the fall of 1899, stable manure, at the rate of fifteen one-horse cartloads per acre, was spread on and ploughed under with the clover. In the following spring this was harrowed with the disc and smoothing harrows, and fifteen one-horse cartloads of stable manure again applied and ploughed under. This was then gone over twice with the disc, once with the spring-tooth, and once with the smoothing harrows, after which 100 pounds of bone meal and 100 pounds of complete fertilizer per acre was sown, and harrowed in with the smoothing harrow.

The land was drilled into rows 24 inches apart. The rows were raked off by hand, a mark made along the top of the row, and the seed dropped, and lightly covered, after which the land roller went over them. In the field crops, where part were rolled after seeding, and others left unrolled, the plants started much more regular and vigorous where not rolled.

The first series of plots were sown May 29, and duplicate ones two weeks later, June 12. Both the early and late sown plots were pulled November 3, and the yield per acre calculated from two rows, each 66 feet long. Twenty-eight varieties were planted, with results as follows :—

TURNIPS—TEST OF VARIETIES.

No.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Skirvings	42	1,800	1,430	..	26	1,625	893	45
2	Imperial Swede	42	1,305	1,421	45	29	1,400	990	
3	Hartley's Bronze	42	975	1,416	15	25	1,975	866	15
4	Monarch	42	480	1,408	..	23	1,850	797	30
5	Carter's Elephant	42	480	1,408	..	21	1,725	729	45
6	Selected Champion	40	1,675	1,361	15	25	325	838	45
7	Kangaroo	40	850	1,347	30	26	1,150	852	30
8	Drummond Purple Top	38	1,880	1,298	..	26	1,625	893	45
9	Hall's Westbury	38	1,550	1,292	30	27	450	907	30
10	Pearce's Prize Winner	37	1,900	1,265	..	26	1,625	893	45
11	East Lothian	37	1,075	1,251	15	28	1,750	967	30
12	Halewood's Bronze Top	37	1,075	1,251	15	28	100	935	
13	Shamrock Purple Top	37	745	1,245	45	23	1,850	797	30
14	Prize Purple Top	37	250	1,237	30	26	800	880	
15	Elephant's Master	37	250	1,237	30	26	1,625	893	45
16	Mammoth Clyde	36	600	1,210	..	21	1,725	729	45
17	Perfection Swede	35	950	1,182	30	25	1,975	866	15
18	Bangholm Selected	35	125	1,168	45	23	1,025	783	45
19	New Arctic	34	1,300	1,155	..	22	1,375	756	15
20	Magnum Bonum	34	1,300	1,155	..	29	1,400	990	
21	West Norfolk Red Top	33	1,980	1,133	..	28	925	948	45
22	Jumbo	33	1,650	1,127	30	22	1,375	756	15
23	Champion Purple Top	33	.....	1,100	..	24	675	811	15
24	Selected Purple Top	33	.....	1,100	..	30	1,050	1,017	30
25	Marquis of Lorne	31	1,525	1,058	45	18	1,455	624	15
26	Giant King	30	225	1,003	45	18	1,950	632	30
27	Sutton's Champion	30	.....	1,000	..	29	575	976	15
28	Webb's Renown	27	1,275	921	15	26	1,625	893	45

FIELD CROPS OF TURNIPS.

The ground on which this crop was grown was previously in corn, having been manured with stable manure, 20 one-horse cart loads per acre, and bone meal and complete fertilizers each at the rate of 100 pounds per acre. After the corn crop was removed, in the fall of 1899, the field was ploughed. In the spring it was disc-harrowed and 18 one-horse cart loads of stable manure per acre spread and ploughed under. It was then worked up with the disc, spring-tooth and smoothing harrows, after which complete fertilizer at the rate of 200 pounds per acre was sown and harrowed in.

Drills were run 24 inches apart and the seed was sown with the turnip seeder One variety was sown on a one-quarter acre plot, four varieties on one-half acre plots, and another variety on a two acre piece. The yield from these field tests were as follows :—

Field Crops.—Turnips.

Name of Variety and size of plot.	Yield per acre.		Yield per acre.	
	Tons.	Lbs.	Bush.	Lbs.
¼ acre plot :—				
Purple Top	25	1,920	865	20
½ acre plot :—				
Kangaroo	29	205	970	5
Elephant	28	1,172	952	52
Laing's Purple Top	27	1,895	931	35
Drummond Purple Top	27	1,247	920	47
2 acres plot :—				
Selected Purple Top	26	1,000	833	20

EXPERIMENTS WITH MANGELS.

Twenty-three varieties of mangels were sown May 29, and duplicate ones two weeks later, June 12. The land adjoined that on which the turnips were grown was similar in character and received the same treatment, namely, manured in the fall and spring, with 30 one-horse cart loads of stable manure per acre, 15 loads being given at each time, the ground well worked up in the spring, and 200 pounds of complete fertilizer per acre sown broadcast and harrowed in with the smoothing harrow.

Drills were run 24 inches apart, after which they were raked off by hand, and the seed planted in holes made by a marker, one foot apart, into which from three to six seeds were dropped. The seed was lightly covered and rolled. On field crops of mangels rolled this year alongside of those unrolled, the latter started much more regular and thrifty.

The crop from these plots was pulled October 25, and the following yields obtained, being calculated from two rows each, 66 feet long :

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Sutton's Prize Winner	51	1,125	1,719	45	33	650	1,127	30
2	Lion Yellow Intermediate	50	1,805	1,696	45	32	1,175	1,086	15
3	Giant Yellow Intermediate	49	175	1,636	15	30	1,875	1,031	15
4	Giant Yellow Half Long	47	875	1,581	15	28	100	935	..
5	Mammoth Intermediate	47	875	1,581	15	33	825	1,113	45
6	Giant Yellow Globe	43	625	1,443	45	39	375	1,306	15
7	Yellow Intermediate	43	625	1,443	45	25	1,150	852	30
8	Champion Yellow Globe	41	1,325	1,388	45	30	1,872	1,031	15
9	Mammoth Long Red	41	1,325	1,388	45	30	1,875	1,031	15
10	Yellow Fleshed Tankard	41	5	1,366	45	28	1,255	954	15
11	Prize Mammoth Long Red	40	1,675	1,361	15	25	1,150	852	30
12	Selected Mammoth Long Red	40	25	1,333	45	28	100	935	..
13	Gate Post	40	25	1,333	45	30	225	1,003	45
14	Norbiton Giant	39	375	1,306	15	31	1,525	1,059	45
15	Canadian Giant	37	250	1,237	30	28	1,750	962	30
16	Golden Fleshed Tankard	35	950	1.182	30	26	305	871	45
17	Mammoth Oval Shaped	34	475	1,141	15	28	1,750	962	30
18	Gate Post Yellow	33	1,650	1,127	30	25	655	844	15
19	Ward's Large Oval Shaped	33	1,650	1,127	30	24	1,500	825	..
20	Warden Orange Globe	32	175	1,069	35	28	925	948	45
21	Half Long Sugar Rosy	30	1,875	1,031	15	22	1,375	756	15
22	Half Long Sugar White	27	1,275	921	15	26	1,025	883	45
23	Red Fleshed Tankard	26	1,625	893	45	21	1,725	728	45

FIELD CROPS OF MANGELS.

This land was previously in oats, and Mammoth Red Clover, which was sown with the grain, gave a good mat of growth to plough under.

The field was ploughed in the fall of 1899, and the following spring was harrowed, after which manure at the rate of 30 one-horse cartloads per acre was ploughed under. This was then worked up with the disc, spring-tooth and smoothing harrows, after which, complete fertilizer at the rate of 200 pounds per acre was sown broadcast and harrowed in.

Drills were run 24 inches apart and the seed planted in holes one foot apart, made with a marker, from 3 to 6 seeds being dropped in a place. Part of these were covered by running a land roller over the rows, and part by hand with a garden rake ; the latter came up more regular and healthy. Three varieties were grown in acre plots, and one variety in a one-quarter acre plot.

Name of Variety and size of plot.	Yield per acre.		Yield per acre.	
	Tons.	Lbs.	Bush.	Lbs.
1 acre plot :—				
Mam. Long Red	26	62	867	12
Yellow Intermediate	28	1,645	960	45
Yellow Globe	26	1,410	890	10
¼ acre plot :—				
Long Red	18	1,600	626	40

EXPERIMENTS WITH CARROTS.

The carrot plots were on land adjoining the turnip and mangel plots, which was of similar character and received the same treatment.

The rows were 24 inches apart, and were raked off, a mark being made along the top of the row, into which the seed was dropped and covered, after which the rows were rolled.

Nineteen varieties were sown May 29, and a duplicate set of plots two weeks later, June 12. The crop was pulled October 25.

The following results were obtained, the yield per acre being calculated from 2 rows, each 66 feet long :—

CARROTS—TEST OF VARIETIES.

No.	Name of Variety.	Yield per Acre — 1st Plot.		Yield per Acre — 1st Plot.		Yield per Acre — 2nd Plot.		Yield per Acre — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Half-long White...	30	1,875	1,031	15	15	195	503	15
2	Mammoth White Intermediate.........	29	80	968	00	16	505	541	45
3	Green Top White Orthe...............	26	1,955	899	15	12	255	404	15
4	Giant White Vosges..................	25	325	838	45	15	195	503	15
5	Ontario Champion..................	25	325	838	45	12	255	404	15
6	New White Intermediate.	23	1,025	783	45	17	650	577	30
7	Early Gem.	22	1,705	761	45	15	855	514	15
8	White Vosges Large Short............	21	405	706	45	10	955	349	15
9	Improved Short White................	21	75	701	15	17	155	569	15
10	Long Scarlet Altringham..............	19	1,600	660	00	9	1,305	321	45
11	Guerande or Ox-Heart................	19	775	646	15	13	895	448	15
12	Iverson's Champion.	19	280	638	00	14	875	481	15
13	White Belgian.........	18	1,455	624	15	12	1,575	426	15
14	Half-long Chantenay......	17	1,475	591	15	15	1,680	528	00
15	Yellow Intermediate................	17	650	577	30	13	400	440	00
16	Long Orange or Surrey	17	320	572	00	9	1,305	321	45
17	Carter's Orange Giant............	17	25	567	5	10	1,450	357	30
18	Scarlet Intermediate.....	14	1,205	486	45	9	150	302	30
19	Scarlet Nantes.....	14	875	481	15	9	975	316	15

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were sown May 29, and a duplicate set of plots on June 12. These plots were on land adjoining the other two plots, and was of similar character, receiving the same treatment. The seed was planted in the same manner as the mangel plots. The crop was pulled October 24, and the yield per acre has been calculated from the weight of the crop from 2 rows, each 66 feet long :—

SUGAR BEETS—TEST OF VARIETIES.

No.	Name of Variety.	Yield per Acre — 1st Plot.		Yield per Acre — 1st Plot.		Yield per Acre — 2nd Plot.		Yield per Acre — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Imperial................	37	1,075	1,251	15	23	1,355	789	15
2	Red Top Sugar....................... .	35	125	1,168	45	23	200	770	00
3	Danish Red Top....	30	1,875	1,031	15	25	325	838	45
4	Wanzleben.	28	1,225	954	15	19	1,005	650	05
5	Danish Improved......................	25	325	838	45	20	425	673	45
6	Vilmorin's Improved........	22	1,375	756	15	21	1,725	728	45

EXPERIMENTS WITH POTATOES.

The soil on which the potatoes were grown was a heavy loam. The previous crop was oats and pease, cut green for feed ; manure at the rate of 30 one-horse cartloads per acre was spread and ploughed under in the early fall of 1899. In the spring the land was harrowed with the disc and smoothing harrows and again ploughed, after which the disc and smoothing harrows were again used. Drills were run 30 inches apart and potato fertilizer at the rate of 400 pounds per acre was scattered along in the drill.

The seed was cut leaving from two to three eyes in each piece, and planted one foot apart in the drills and covered with the plough.

Eighty-one varieties were planted June 6 and dug October 16. The plots made vigorous growth. Bordeaux mixture was sprayed on the plants July 27, August 17 and 27. The potatoes in neighbouring fields were exceptionally bad from blight, while these plots were apparently clear of it, which was no doubt due to the use of the Bordeaux mixture.

The crop was harvested late, due to the exceptionally wet weather, making it impossible to harvest them earlier, consequently increasing the percentage of rot. The yield per acre is calculated from two rows each, 66 feet long, as follows :—

POTATOES—TEST OF VARIETIES.

No.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Holborn Abundance..	605	..	572	..	33	.	490	36	81	24	Round, white.
2	Irish Daisy..	589	36	512	36	77	..	385	..	127	36	"
3	Irish Cobbler	536	48	470	48	66	..	382	48	88	..	"
4	Everett	506	..	446	36	59	24	352	..	94	36	Flattish, pink.
5	Pearce's Prize Winner	501	36	457	36	44	..	347	36	110	..	Long, white.
6	Seattle....	495	..	440	..	55	..	363	..	77	..	"
7	Northern Spy.. ...	492	48	470	48	22	..	396	.	74	48	Round, red.
8	Sharpe's Seedling....	490	36	439	24	50	36	358	36	81	24	Round, pink and white.
9	Vanier	484	..	473	.	11	..	352	..	121	..	Long, pink.
10	Early Puritan..	484	..	402	36	81	24	325	36	77	..	" white.
11	Bill Nye	477	24	435	36	41	48	385	..	50	36	Round "
12	Burnaby Seedling....	477	24	389	24	88	..	312	24	77	..	" pink.
13	Clay Rose.	477	24	462	..	15	24	330	..	132	..	" "
14	Carman No. 1........	475	12	421	48	52	48	325	36	96	48	Flat, round, white.
15	Early Six Weeks . .	473	..	363	..	110	..	264	..	99	..	Oblong, pink.
16	American Wonder....	473	..	374	..	99	..	308	..	66	..	Round, white.
17	Bruce's White Beauty	468	36	411	24	57	12	330	..	81	24	Long, white.
18	Seedling No. 7.. .	466	24	444	24	22	..	385	..	59	24	Oval, pink.
19	Bovee....	466	24	415	48	50	36	330	..	85	48	Long "
20	Columbus..	462	..	343	12	118	48	259	36	83	36	" " and white.
21	Rural Blush..........	462	..	424	36	37	24	314	36	110	..	Round, pink.
22	Ohio Junior	462	..	387	12	74	48	310	12	77	..	" "
23	Pride of the Market..	455	24	334	24	121	..	253	..	81	24	Long pink and white.
24	Hale's Champion.....	451	..	429	..	22	..	319	..	110	..	Long, white.
25	Dreer's Standard	451	..	378	24	72	36	301	24	77	..	Round "
26	Empire State .. .	451	..	374	..	77	..	303	36	70	24	Oval "
27	Dakota Red	451	..	451	..	.....	...	374	..	77	..	Round, red.
28	Seedling No. 230.....	451	..	440	..	11	..	374	..	66	..	" white.
29	Early Norther.......	448	48	345	24	103	24	242	..	103	24	Long, pink and white.
30	Cambridge Russet....	448	48	415	48	33	..	305	48	110	..	Round, white.
31	American Giant	444	24	367	24	77	..	308	..	59	24	Long, white.
32	Flemish Beauty.. . .	444	24	356	24	88	..	290	24	66	..	" flat, pink.
33	Early Market........	444	24	389	24	55	..	308	..	81	24	Round, pink.
34	Sir Walter Raleigh...	440	..	407	..	33	..	352	..	55	..	" " and white.
35	Quaker City..........	437	48	374	..	63	48	332	12	41	48	" white.
36	Rose, No. 9...	435	36	429	..	6	36	371	48	57	12	Oblong, pink.
37	Great Divide	435	36	363	..	72	36	275	..	88	..	Long, white.
38	New Queen....... ..	435	36	347	36	88	..	275	..	72	36	Oblong, pink.
39	Beauty of Hebron....	433	24	363	..	70	24	297	..	66	..	Round, pink and white.
40	Swiss Snowflake	431	12	400	24	30	48	356	24	44	..	Round, white.
41	Delaware.......... ..	424	36	380	36	44	..	308	..	72	36	" "
42	New Variety No. 1...	424	36	380	36	44	..	314	36	66	..	" pink.
43	Thorburn	422	24	327	48	94	36	270	36	57	12	Oblong, pink and white
44	Maggie Murphy	422	24	281	36	140	48	235	24	46	12	Long, pink.
45	Rochester Rose	420	12	404	48	15	24	343	12	61	36	Oblong, pink.
46	Early Harvest..	418	..	367	24	50	36	297	..	70	24	Oval, pink and white.
47	Burpee's Extra Early.	418	..	347	36	70	24	275	..	72	36	Long " "
48	Clarke's, No. 1	418	..	330	..	88	..	264	..	66	..	Long pink.
49	Troy Seedling........	418	..	374	..	44	..	308	..	66	..	Round, white.
50	Prize Taker	413	36	319	..	94	36	233	12	85	48	" "
51	Uncle Sam	413	36	369	36	44	..	330	..	39	36	Oblong "
52	Maule's Thoroughbred	407	..	330	..	77	..	242	..	88	..	" "
53	I. X. L	402	36	314	36	88	..	270	36	44	..	Long, pink and white.
54	Brown's Rot Proof....	402	36	402	36	......	...	215	36	187	..	Oval, white.
55	Money Maker	396	..	330	..	66	..	242	..	88	..	Long, pink and white.
56	Green Mountain..	396	..	332	12	63	48	270	36	61	36	Oval, white.
57	Carman, No. 3.......	396	..	347	36	48	24	275	..	72	36	Round "

POTATOES—TEST OF VARIETIES—*Continued.*

No.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
58	Vick's Extra Early...	396	..	345	24	50	36	286	..	59	24	Oval, white.
59	Early Ohio	385	..	336	36	48	24	270	36	66	..	Long, pink.
60	Daisy	385	..	336	36	48	24	242	..	94	36	" pink and white.
61	Reeve's Rose.........	378	24	334	24	44	..	253	..	81	24	" pink.
62	General Gordon	376	12	279	24	96	48	222	12	57	12	Oblong, pink.
63	Lee's Favourite......	367	24	290	24	77	..	226	36	63	48	Round, white.
64	Country Gentleman ..	363	..	292	36	70	24	220	..	72	36	Long, pink and white.
65	Early White Prize ...	360	48	301	24	59	24	231	..	70	24	Round, white.
66	McIntyre	360	48	343	12	17	36	292	36	50	36	" " and blue.
67	Early Rose	360	48	299	12	61	36	244	12	55	..	Long, pink.
68	Earliest of all........	354	12	341	..	13	12	264	..	77	..	" "
69	Pearce's Extra Early.	352	..	303	36	48	24	231	..	72	36	" "
70	State of Maine	347	36	325	36	22	..	264	..	61	36	Round, white.
71	Houlton Rose.... ...	334	24	275	..	59	24	209	..	66	..	Long, pink.
72	Chicago Market......	334	24	275	..	59	24	231	..	44	..	" red.
73	Early Michigan......	330	..	275	..	55	..	220	..	55	..	" white.
74	Lizzie's Pride........	330	..	297	..	33	..	220	..	77	..	" pink.
75	Reading Giant.... ...	330	..	330	..	....		242	..	88	..	Oval, pink.
76	Late Puritan.........	330	..	277	12	52	48	226	36	50	36	Long, white.
77	Brownell's Winner...	325	36	288	12	37	24	215	36	72	36	" pink.
78	Rural No. 2..........	308	..	268	24	39	36	242	..	26	24	Round, white.
79	Polaris	272	48	261	48	11	..	187	..	74	48	Long "
80	Early Sunrise........	259	36	200	12	59	24	160	36	39	36	" pink.
81	Penn Manor	226	36	158	24	68	12	136	24	22	..	" "

EXPERIMENTS WITH SOJA AND HORSE BEANS SOWN AT DIFFERENT DISTANCES APART.

Experiments, as conducted last year, with soja and horse beans sown at different distances apart, were again carried on this season. The object being to determine whether rows planted closely together will give as large, or larger, returns per acre than those further apart, and also a comparison of these two crops.

The soil was a clay loam, and twenty-five one-horse cart-loads of stable manure per acre was ploughed under in the spring, and worked up with the disc, spring-tooth, and smoothing harrows. The beans were sown with the seed drill June 13, in plots of one-fortieth acre each. The crop was cut October 4, and yields per acre obtained as follows :—

Soja Beans.

Distance apart. Inches.	Yield per acre. Tons.	Lbs.
21	5	1,200
28	4	1,900
35	4	1,700

Horse Beans.

Distance apart. Inches.	Yield per acre. Tons.	Lbs.
21	7	.....
28	6	1,100
35	7	500

EXPERIMENTS WITH FLAX.

The soil was similar, and received the same treatment, as that on which the barley plots were grown. The plots were one-fortieth of an acre each. The object of the experiment was to gain information as to the best time for sowing, and the quantity of seed that should be sown to give the heaviest crop. Four sowings were made, a week apart, and two plots were sown at each time, one with seed at the rate of 40 pounds per acre, and the other at the rate of 80 pounds per acre.

The first sowing was made June 6. The results obtained were as follows:—

Flax.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Weight of Straw Per Acre.	Yield per Acre.		Weight per Bushel.
				Lbs.	Bush.	Lbs.	Lbs.
No. 1, 80 lbs. per acre	June 6	Sept. 5	91	4,280	15		52½
No. 1, 40 " "	" 6	" 5	91	3,260	13	32	53
No. 2, 80 " "	" 13	" 9	88	3,880	12	48	53
No. 2, 40 " "	" 13	" 9	88	4,200	11	24	54
No. 3, 80 " "	" 20	" 16	88	3,460	12	8	52½
No. 3, 40 " "	" 20	" 16	88	3,420	10		53
No. 4, 80 " "	" 27	" 20	85	4,280	11	4	50
No. 4, 40 " "	" 27	" 20	85	3,620	12	8	51

EXPERIMENTS WITH MILLETS.

The land for these plots was a clay loam, and had as a previous crop potatoes. It was manured in the fall of 1898 for the potatoes at the rate of 25 one-horse cartloads of stable manure per acre, and potato fertilizer at the rate of 500 pounds per acre was also applied when the potatoes were planted.

The land was ploughed after the potatoes were removed and was worked up the following spring with the disc, spring-tooth and smoothing harrows ; no fertilizer of any kind was used. The seed was sown with the seed drill June 14, and the crop harvested September 15. Seven varieties were grown in plots of one fortieth acre each. The following table gives the yield per acre of green crop cut :—

MILLETS.

Name of Variety.	Yield Per Acre.	
	Tons.	Lbs.
Italian or Indian	16	
Japanese	13	
Golden	10	
White Round or Extra French	9	1000
Moha Hungarian	8	1000
Algerian	8	
Pearl	7	

SPECIAL EXPERIMENTS WITH FERTILIZERS.

As stated in my last annual report, these experiments were laid out for the purpose of ascertaining the relative value of the fertilizers commonly used for field crops of various kinds.

The plots were one-eighth acre each, 38 x 143½ feet, for each kind of fertilizer used. The series of plots were again subdivided into ten strips 14 feet wide each, running lengthwise over all the different fertilizer plots, on which ten different kinds of crops were sown, namely, potatoes, mangels, turnips, carrots, corn, mixed grain, oats, pease, barley and wheat, making in all 140 plots ; a margin of 2 feet was left between each plot and 1 foot between each crop plot.

Two plots were left without any fertilizer as check plots. Each of the crops were sown at about the same time as the uniform test plots of the particular crop, with the same amount of seed per acre and were cultivated in the same manner. The crop of pease was destroyed by the pea aphis and no record was obtained. The following table gives the yield per acre for the other crops. The quantity and kinds of fertilizers used are applied each year. This is the second year of the test :—

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Quantities of Fertilizers Used Per Acre.	Barley, Duckbill.		Oats, Banner.		Wheat, Colorado.		Mixed Grain, Oats, Barley and Pease.		Corn, mixed, Mastodon, White Flint, White Cap.		Turnips.		Mangels.		Carrots.		Potatoes, Delaware and State of Maine. Sound.		Potatoes, Rotten.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Manure, 30 tons	64	28	102	32	41	40	94	8	22	1,500	32	1,700	35	1,500	28	500	351	40	66	40
Manure, 15 tons and complete fertilizer, 250 lbs.	66	32	105	30	43	20	102	32	24	500	38	300	36	500	28	300	370		75	
Complete fertilizer, 1,000 lbs	54	8	94	4	38	20	91	6	19	1,000	32	300	21	1,500	27	1,500	346	40	53	20
" " 500 "	50		88	8	35		88	8	16		30	1,700	23	500	26	1,700	323	20	50	
Check (no fertilizer)	47	44	67	22	31	40	79	14	13	1,000	28	1,500	14	1,000	22	1,000	283	20	28	20
Bone meal, 1,000 lbs	62	24	97	2	36	40	88	8	15	1,500	33	500	21	1,000	27	500	275		38	20
" 500 "	56	12	85	10	33	20	82	12	16	500	32	1,000	23	1,500	21	1,700	258	20	25	
Ashes, 2,500 lbs.	52	4	82	12	33	20	82	12	16	1,000	24	1,500	22	1,000	21	500	236	40	33	20
Manure, rotted, 20 tons	62	24	100		40		94	8	21	500	36	300	25	300	27	1,700	356	40	45	
Check (no fertilizer)	43	36	61	26	28	20	73	18	8	500	16	1,700	10	300	17	1,700	201	40	20	
Land plaster, 500 lbs	45	40	64	24	30		76	16	10	1,500	17	1,700	10	1,500	18	1,000	260		55	
Salt, 500 lbs	54	8	79	14	35		91	6	11	1,000	21	200	20		18	1,700	246	40	46	40
Marsh mud, 100 tons	60	20	94	4	36	40	88	8	14		24		27	1,000	21	500	250		53	20
Manure, 20 tons (green)	64	28	100		40		97	2	18	500	32		33	600	26	1,500	345		58	20

EXPERIMENTS WITH FIELD BEANS.

The four varieties of field beans tested last year were again grown this season. They were sown in one-twentieth acre plots June 13, and harvested October 4. The variety White Field Medium did not mature well, only about one-half of its yield being marketable. The variety Mexican Tree did not mature sufficiently to obtain a yield.

	Yield per acre. Bush.	Lbs.	Lbs. per bushel.
White Marrowfat....	34	15	61
California Pea Bean....	29	30	61
White Field Medium....	20	30	56

HAY.

Seven acres of upland previously in pasture, being seeded down with grain in the spring of 1899, gave a yield of 10 tons 1,015 pounds. The catch of clover and timothy on this piece of land was poor, and the soil also being poor, a small crop was obtained.

Four acres of clover and timothy on the upland seeded down in the spring of 1899, yielded 12 tons 1,995 pounds of prime clover hay. Three acres of timothy on the upland yielded 5 tons 795 pounds.

Four acres of clover and timothy on the marsh seeded in the spring of 1899, yielded 10 tons 825 pounds. Thirty-eight acres of marsh also yielded 59 tons 525 pounds of timothy, clover and couch. Three acres of marsh gave 5 tons, 1,970 pounds of timothy and brood-leaf hay mixed. This made a total of 104 tons 1,125 pounds harvested in good condition.

CANARY SEED.

A plot of canary seed of one-fortieth acre was sown, June 5. The land was a heavy clay loam, and was manured in the spring with 25 one-horse cart-loads of stable manure per acre. This was ploughed under and the land worked up before seeding. The plot was cut September 15, and yielded at the rate of 11 bushels 32 pounds per acre.

SAND VETCH AND COW PEA.

A twentieth-acre plot of each of these crops was sown June 5, on heavy clay loam. It was manured with 25 one-horse cart-loads of stable manure per acre in the spring, and ploughed under. The land was then worked up and the seed sown.

The Cow Pea made weak growth, and soon was badly overrun with weeds. The crop was not of sufficient consequence to harvest, and was ploughed under.

The Sand Vetch made quite a vigorous growth, but did not mature. This was also ploughed under.

EXHIBITIONS ATTENDED.

Some products, to illustrate the various experiments carried on at the farm, were shown at the three provincial exhibitions. Bottled fruit of various kinds, grain in straw and threshed, also roots, potatoes, fodder crops and vegetables.

A wall space of some 500 square feet, and table space of 180 square feet, was filled at the International Exhibition, St. John, N.B., from September 8 to 19, and an equal amount of space was occupied at the Nova Scotia Provincial Exhibition, Halifax, from the 12th to the 20th of September; both these exhibitions being held at the same time made it necessary to prepare two exhibits.

The Prince Edward Island Exhibition at Charlotteton, P.E.I., from the 25th to the 29th, was also attended, and a wall space of 800 square feet, and 250 square feet of table space, was taken up with farm produce and illustrative charts.

I also attended the exhibitions at Sackville and Sussex, N.B.

GRAIN AND POTATO DISTRIBUTION.

Some of the most promising varieties of seed grain and potatoes were again distributed in the spring to those who made application.

The following number of packages were sent to the various applicants :—

Oats	293
Barley	83
Wheat	61
Pease	20
Buckwheat	15
Potatoes	253
Total	725

CORRESPONDENCE.

Apart from the receipt and despatch of circulars, there were 1,302 letters received, and 1,077 sent out.

HORSES.

There are seven horses at present kept on this farm, four of which are used exclusively as draught horses, two for general purposes (single or double), and one driver. Only one change has been made during the past year, which was in the case of the driver ; she having become unsound was exchanged for another 3-year old. All are perfectly sound, and in first-class condition.

CATTLE.

The herd on the farm at present consists of :—

1 Guernsey bull, 5 years old.
1 Ayrshire bull, 2½ years old.
1 Ayrshire bull calf.
1 Guernsey bull calf.
1 Holstein bull calf.
2 Guernsey cows.
2 Ayrshire cows.
1 Holstein cow.
2 Ayrshire heifers, 1½ years old.
1 Holstein heifer, 1½ years old.
22 grade milch cows.
4 grade heifers, 1½ years old.
7 heifer calves.

EXPERIMENTS WITH COWS.

The experiment with the dairy herd during the past year was identical with that of 1899, namely, to determine whether a fairly good dairy herd, well fed and cared for, would leave a credit balance, after paying for feed consumed at current prices. The experiment was begun on November 28, 1899, and continued until November 27, 1900.

The prices for feed this year were, on the whole, somewhat lower, while the prices of products was slightly higher than last year. Wheat and bran, $17.50 per ton ; oats and corn (including grinding), each $22 per ton ; peameal, $29 per ton, making an average price of meal ration, in the proportions fed to cows, of 1 cent per pound. Roots, 5 cents per bushel ; ensilage $2 per ton ; hay, $7 per ton, and straw, $3 per ton. The average price of butter for the twelve months was 21 cents per pound, being an advance of 1 cent per pound on last year's price.

The daily rations for cows in full milk in winter was :—Ensilage or roots, 30 pounds, 3 cents ; hay and straw, 20 pounds, 5 cents ; bran and meal, 9 pounds, 9 cents, making a total cost of 17 cents per cow per day. When not milking in winter they were charged $2 per month.

Different quantities were fed to different cows, according to their capacity to consume and produce.

Twelve were in full milk when the experiment began, the remainder coming in fresh at various times until spring. They were kept in the stable from November 1, 1899, until June 1, 1900, except on occasional fine days, when they were allowed out in the yard.

They were fed twice each day only, and had water before them all the time. The temperature of the stable was kept as near 60° Fahrenheit as possible all the time, and the temperature of the water, which was run into the cows pail direct from the spring, was 35° Fahrenheit, being 4° colder than when run into a tank and left there 12 hours, as was formerly done. No bad effect was perceptible from the drinking of colder water, although no experiment was carried on to determine that point.

They were fed, cared for, and milked as regularly as possible by the same persons all the time.

They were put to pasture on June 1, and from that date until July 31 were out night and day. During August they were out at night and in during the day. During September and October they were in the stable at night and in the pasture during the day time.

After June 15, the pasture was practically done, and the cows were fed on green clover in the stable until July 15, after which date they were fed on a mixture of oats, pease and vetches sown for that purpose, at intervals of one week apart. The green feed fed to 30 cows for soiling season of five months, was grown on an area of land not exceeding ten acres.

While milking they were charged $1.50 per month, and while dry they were turned back in the bush pasture and charged $1 per month.

The milk of each cow was weighed at milking twice each day, and a careful record kept of the number of pounds given.

A test of each cow's milk was made from time to time by means of the Babcock milk tester. The weight of butter was determined on the basis that 84 pounds butter fat produces 100 pounds of marketable butter.

The milk was sent to the Nappan dairy station, and the cows were credited with the butter produced, at the prices paid to all patrons of that station, which averaged for the year 21 cents per pound, less 4 cents per pound for manufacturing the butter and hauling the milk.

The skim milk was fed to calves and pigs, and credited to the cows at the rate of 15 cents per 100 pounds.

Nos. 7, 9, 14 and 21 were disposed of to the butcher during the summer, and No. 27, one of the spring calving cows, died of milk fever the day after dropping her calf.

The following table will show the results obtained during the year :—

TEST OF DAIRY HERD.

Number.	Breed.	Days Milking.	Lbs. Milk.	Per cent B. Fat.	Lbs. Butter.	Value Butter at 21c. per lb.	Value Skim Milk.	Total Credit.	Cost of Feed.	Cost of Making Butter at 4c. per lb.	Total Cost.	Profit for Year.
						$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.
11	Ayrshire...........	252	8,425	3·4	341.00	71 61	8 42	80 03	41 12	13 64	54 76	25 27
6	Ayrshire Grade	272	7,540	3·4	305·19	64 08	7 54	71 62	35 25	12 20	47 45	24 17
2	Holstein.	256	8,326	3·2	317·55	66 68	8 32	75 00	41 12	12 70	53 82	21 19
5	Ayrshire Grade.........	240	7,164	3·8	323·84	68 00	7 16	75 16	41 12	12 95	54 07	21 08
18	" "	260	6,050	4·0	288·09	60 54	6 05	66 59	39 90	11 52	45 42	21 12
31	Guernsey.	270	5,950	4·4	264·52	55 54	5 95	61 49	30 80	10 58	41 38	20 11
4	Ayrshire Grade...	364	7,140	3·6	306·00	64 26	7 14	71 40	39 93	12 25	52 18	19 22
30	Jersey Grade.	304	5,460	4·4	286·00	60 06	5 46	65 52	34 85	11 44	46 29	19 23
25	Shorthorn Grade.... ...	260	6,570	3·8	297·21	62 41	6 57	68 98	38 17	11 88	50 05	18 93
3	Ayrshire Grade.........	270	6,040	3·6	258·85	54 35	6 04	60 39	33 90	10 35	44 25	16 14
1	Holstein...............	280	7,825	3·3	307·40	64 55	7 82	72 37	44 20	12 29	36 69	15 68
8	Sh. Ayrshire Grade......	270	6,100	3·6	261·42	54 89	6 10	60 99	35 25	10 45	45 70	15 29
19	Ayrshire Grade.........	245	6,210	3·6	266·14	55 88	6 21	62 09	36 80	10 64	47 44	14 65
15	" "	280	5,830	3·8	263·73	55 38	5 83	61 21	36 50	10 54	47 04	14 17
28	Jersey Grade..........	300	5,940	3·5	247·50	51 97	5 94	57 91	35 00	9 90	44 90	13 01
32	Ayrshire "	282	5,130	3·5	225·65	47 38	5 13	52 51	32 35	9 02	41 37	11 14
17	Guernsey.	210	4,330	4·2	216·59	45 47	4 33	49 80	29 43	8 66	38 09	11 71
13	Ayrshire Grade..... ...	265	5,420	3 7	238·73	50 13	5 42	55 55	34 81	9 54	44 35	11 20
16	Ayrshire...............	285	5,620	3·9	260·92	54 78	5 62	60 40	39 18	10 43	49 61	10 79
22	" Grade.........	275	6,010	3·5	250·41	52 58	6 01	58 59	39 15	10 01	49 16	9 43
12	" "	300	4,965	3·9	230 51	48 40	4 96	53 36	35 31	9 22	44 53	8 83
26	" "	296	5,040	3·6	216 00	45 36	5 04	50 40	33 90	8 64	42 54	7 86
20	" "	240	4,010	3·8	181 40	38 09	4 01	42 10	28 25	7 25	35 50	6 60
23	" "	252	5,120	3·6	219 42	46 07	5 12	51 19	37 07	8 77	45 84	5 35
21	" "	210	3,620	3·9	168 07	35 29	3 62	38 91	27 30	6 72	34 02	4 89
29	" "	252	4,320	4·0	205 71	43 19	4 32	47 51	36 50	8 22	44 52	2 79
24	" "	276	4,534	3·6	194 30	40 80	4 53	45 33	36 51	7 77	42 28	3 05
7	Shorthorn Grade........	210	3,345	3·3	155 21	32 59	3 34	35 93	27 45	6 20	33 65	.....
10	" "	270	444	3·8	187 47	39 36	4 14	43 50	33 90	7 49	41 39	......
14	" "	90	1,930	3·6	82 71	17 36	1 93	19 29	17 45	3 30	20 75	......
9	" "	204	2,160	3·4	87 42	18 35	2 16	20 51	27 30	3 49	30 79	......
27	Jersey Sh. Grade........	148	1,835	4·2	91 75	19 26	1 83	21 09	18 85	3 66	22 51	.... .

STEER FEEDING—DEHORNING.

This test was carried on with a view to gain information as to the advisability of dehorning full grown steers, at the commencement of a feeding period, whether fed in loose boxes or tied in stalls.

Twelve 3½ year old Shorthorn grade steers were used for this test, in 3 lots of 4 each, of as nearly as possible equal form, fatness and weight.

They were bought on October 30, and weighed on the morning of October 31, after having fasted 14 hours. The horns were then taken off lots 1 and 2, and left on lot 3. Lot 1 were put into a loose box-stall, lots 2 and 3 were tied up in stalls—lot 3 having their horns on.

The dehorning was done with the Keystone dehorning clipper. All bled profusely, some suffering considerably, while others did not seem to mind it much.

On being re-weighed, two days after dehorning, the dehorned steers were found to have shrunk, on average, 50 pounds per steer, and from repeated weighings, at intervals of two days, it was found at November 15, i.e., two weeks after dehorning, they had barely regained their original weight.

The three lots were fed alike all the time. The ration fed per steer per day from November 16 to December 16, was : roots, 75 pounds ; meal, 4 pounds ; hay and straw, 5 pounds of each. From December 16 to January 15 : roots, 50 pounds ; meal, 6 pounds ; hay and straw, as in previous month. From January 15 to February 14 : roots, 25 pounds ; meal, 8 pounds ; hay, 12 pounds. For the remainder of the time until March 31 : 1 pound of oil meal per steer per day was added to the ration of the previous month. They were kept in the stable all the time, except on occasional fine days, averaging probably once a week, when they were allowed out in the yard. They were fed twice each day, at regular intervals, receiving half of their daily ration each time.

They were watered twice each day, from pails fastened in the corner of their manger, receiving all the water they wanted, and the pail being left full each time of watering.

RECORD OF STEERS FED, FROM NOVEMBER 16, 1899 TO MARCH 31, 1900.

TABLE I—LOT No. 1—DEHORNED, FED IN LOOSE BOX.

No.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Totals.
17	1,240	1,290	50	1,335	45	1,385	50	1,395	10	1,440	45	1,460	20	1,505	45	1,540	35	1,565	25	325
18	1,200	1,240	40	1,290	50	1,310	20	1,330	20	1,400	70	1,455	55	1,465	10	1,475	10	1,485	10	285
19	1,150	1,220	70	1,260	40	1,300	40	1,320	20	1,360	40	1,405	45	1,455	50	1,470	15	1,505	35	355
20	1,140	1,200	60	1,250	50	1,280	30	1,300	20	1,320	20	1,335	15	1,400	65	1,420	20	1,445	25	305
																				1,270
LOT No. 2.—DEHORNED, TIED IN STALLS.																				
11	1,210	1,245	35	1,280	35	1,320	40	1,330	10	1,350	20	1,380	30	1,440	60	1,465	25	1,480	15	270
12	1,200	1,235	35	1,240	5	1,280	40	1,290	10	1,305	15	1,330	25	1,370	40	1,380	10	1,395	15	195
13	1,200	1,230	30	1,245	15	1,280	35	1,300	20	1,320	20	1,365	45	1,380	15	1,410	30	1,425	15	225
14	1,100	1,145	45	1,210	65	1,245	35	1,260	15	1,290	30	1,335	45	1,385	50	1,400	15	1,415	15	315
																				1,005
LOT No. 3.—HORNS ON, TIED IN STALLS.																				
9	1,290	1,325	35	1,340	15	1,380	40	1,400	20	1,410	10	1,420	10	1,470	50	1,485	15	1,505	20	215
10	1,220	1,265	45	1,290	25	1,325	35	1,340	15	1,355	15	1,410	55	1,415	5	1,435	20	1,440	5	220
15	1,060	1,090	30	1,140	50	1,160	20	1,180	20	1,210	30	1,230	20	1,280	50	1,300	20	1,320	20	260
16	1,115	1,145	30	1,190	45	1,240	50	1,260	20	1,275	15	1,330	55	1,355	25	1,365	10	1,395	30	280
																				975

The results of this experiment may be thus summed up :

1st. That dehorning reduced the weight of a 1,200 pound steer about 50 pounds.

2nd. That it required about two weeks' feeding to regain that weight lost.

It is, however, much more comfortable working around them, and other things being equal, buyers prefer those with horns off (for shipping).

Dehorning is of no advantage when steers are tied up in stalls, except for the comfort it gives to those caring for them.

The feeding of dehorned steers in a loose-box is an advantage : 1st, in increased gain in flesh ; 2nd, less cost for labour in attending them ; 3rd, manure better made, requiring about 50 per cent more straw to keep them clean, which may be an advantage or a disadvantage, according to the situation and opinion of the feeder.

STEER FEEDING—MEDIUM AND HEAVY FEEDING.

An experiment was also carried on with two lots of 4 steers (Shorthorn grades), with a view to getting information as to the advisability of feeding a medium ration or a more heavy one; lot 1 in this test being fed as were all lots in dehorning test, termed medium feeding. Lot 2 were fed an increase of 2 pounds meal and 25 pounds roots per animal per day for the entire period, the money value of increased feed over lot 1 being 4¾ cents per steer per day for 135 days equal $25.64. As will be shown by the following table, there did not appear to be any gain in flesh from extra feeding. The treatment as regards feeding, watering, general care and weighing was exactly the same as in dehorning test.

RECORD OF STEERS FED, FROM NOVEMBER 16, 1899, TO MARCH 31, 1900.

TABLE II—LOT No. 1.—HEAVY FEEDING.

No.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Totals.
1	1,190	1,245	55	1,290	45	1,315	25	1,350	35	1,375	25	1,395	20	1,435	40	1,465	30	1,485	20	295
2	1,240	1,245	5	1,320	75	1,365	45	1,360	0	1,385	20	1,445	60	1,475	30	1,480	5	1,515	35	275
3	1,300	1,365	65	1,375	10	1,415	40	1,425	10	1,465	40	1,495	30	1,515	20	1,525	10	1,545	20	245
4	1,360	1,400	40	1,420	20	1,450	30	1,470	20	1,490	20	1,540	50	1,585	45	1,605	20	1,645	40	285
																				1,100

LOT No. 2.—MEDIUM FEEDING.

No.	Nov. 16.	Dec. 1.	Gain.	Dec. 16.	Gain.	Dec. 31.	Gain.	Jan. 15.	Gain.	Jan. 30.	Gain.	Feb. 14.	Gain.	Mar. 1.	Gain.	Mar. 16.	Gain.	Mar. 31.	Gain.	Totals.
5	1,285	1,330	45	1,355	25	1,360	5	1,360	0	1,410	50	1,435	25	1,495	60	1,495	0	1,515	20	230
6	1,290	1,355	65	1,415	60	1,435	20	1,445	10	1,500	55	1,540	40	1,580	40	1,585	5	1,595	10	305
7	1,120	1,205	85	1,225	20	1,265	40	1,285	20	1,325	40	1,360	35	1,380	20	1,405	25	1,420	15	300
8	1,060	1,090	30	1,130	40	1,170	40	1,195	25	1,205	10	1,220	15	1,240	20	1,240	0	1,255	15	195
																				1,030

The feeds fed were charged at the following prices : 1. Hay, $7 per ton ; straw, $4 per ton ; roots, 5 cents per bushel ; meals : Bran, $17.50 per ton ; cornmeal, $20 per ton ; chop (oats, pease and barley), $22 per ton ; peameal, $28 per ton, and oil cake meal, $30 per ton. The meals fed consisted of varying quantities of the above and was valued at the uniform price of 1⅛ cents per pound. In all costing an average of 15¼ cents per steer per day for the entire period of 135 days.

They were bought on October 30 for 3¾ cents per pound live weight, weighed 9 a.m., after fasting 14 hours, and weighed 24,400 pounds, sold on April 10 for 5½ cents per pound, weighed as when bought as regards fast and weighed 30,000 pounds.

PROFIT AND LOSS.

Twenty steers, weighing when bought 24,400, at 3¾ cents per pound	$ 915 00
Twenty steers, weighing when sold 30,000, at 5½ cents per pound	1,650 00
Balance	$ 735 00
Less cost of food, 160 days at 15¼ cents per day	$ 488 80
" extra amount fed 4 steers, 160 days at 4¾ cts. per day	30 40
Condiments (sulphur, &c.)	5 00
	$ 524 20

Allowing labour of attendance offset by manure, leaves at net balance of $210.80.

If, however, we deduct the value of labour by estimate 3 cents per day per steer, we have a balance of $114.80 besides the manure.

SWINE.

An average of from fifty to seventy-five pigs have been kept on the farm during the past year, representing the following breeds : Yorkshires, Berkshires, Tamworths and their several crosses.

Experiments were carried on with the different lots to determine the feeding value of the various feeds commonly fed and different methods of feeding.

The herd on the farm at present is composed of 1 Yorkshire boar, 1 Yorkshire sow, 1 Tamworth boar, 1 Tamworth sow, 1 Berkshire boar, 1 Berkshire sow, the remaining 60 being crosses of those breeds.

EXPERIMENTS WITH SWINE.

(Feeding on Pasture versus Feeding in Pens.)

On June 30 24 pigs, averaging from four to eight weeks old, were taken for this test, sixteen were put on a fairly good clover pasture, one-half acre in extent, on which had been oats and pease the previous year. They were fed 1 pound of shorts and cornmeal, and 5 pounds of skim-milk per pig per day for 90 days, then they were put in several feeding pens.

The other eight pigs of corresponding breed, age and weight were kept in the pens, and during that 90 days were fed on 2 pounds of shorts and cornmeal and 5 pounds skim-milk per pig per day.

After the 90 days they were all fed alike, each pig receiving 3 pounds of meal per day, and 5 pounds of skim-milk per day until they were ready for the market.

The following table will show the results of the tests, the idea being to determine which way of feeding produced the cheaper pork :—

TABLE I.

Weights and gains of Pigs fed in Pasture.

No.	Breeding.	No. of Pigs.	Weight at Start.	Weight at Finish.	Gain.	No. of Days Fed.	Cost per pound Gain.
			Lbs.	Lbs.	Lbs.		Cents.
1	Yorkshire (d) Berkshire (s)...........	5	160	1,190	1,030	165	2·29
2	Yorkshire (d) Tamworth (s)..........	5	175	1,165	990	180	2·68
3	Yorkshire, Tamworth and Berkshire cross..............................	2	75	523	448	140	1·53
4	Berkshire...........................	2	138	458	320	120	1·80
5	Yorkshire...........................	2	104	440	336	120	1·71

TABLE II.

Weights and gains of Pigs in Pens.

No.	Breeding.	No. of Pigs.	Weight at Start.	Weight at Finish.	Gain.	No. of Days Fed.	Cost per pound Gain.
1	Yorkshire (d) Berkshire (s)...........	3	107	863	756	165	2·26
2	Yorkshire (d) Tamworth (s)..........	2	76	560	484	180	2·61
3	Yorkshire, Tamworth and Berkshire cross..............................	1	40	231	191	140	2·45
4	Berkshire...........................	1	76	232	156	120	2·47
5	Yorkshire...........................	1	80	257	177	120	2·19

TEST OF DIFFERENT FEEDS FOR SWINE.

This experiment was carried on with a view to determine the comparative feeding value of the following feeds :—1st. Buckwheat ; 2nd. shorts ; 3rd. cornmeal and crushed oats ; 4th. Peameal and crushed oats, the last two mentioned being fed in the ratio of 2 to 1. This has been carried on during the past two years.

The pigs were put into this test at the age of about 3 months, in lots of four, from the same litters, at their live weight, after fasting 12 hours.

The ration complete consisted of three pounds of one of the above-mentioned feeds, and an average of five pounds of skim milk per pig per day.

When ready for market, one pig was taken from each lot each time, and these were replaced by four from another litter.

Their gains were ascertained from their increased live weight, after having fasted 12 hours.

They were dressed for market on the farm, and the percentage of dressed weight ascertained in each case.

TABLE III.

PEN NO. 1.—Feed: 2 lbs. Corn Meal, 1 lb. Crushed Oats and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. of Days Fed.	Daily Gain.	Per cent Dressed Weight.
		Lbs.	Lbs.	Lbs.		Lbs.	Lbs.
1	Yorkshire	100	170	70	60	1·16	78·83
2	Berkshire	107	191	64	58	1·10	78·54
3	Yorkshire (d) Berkshire (s)	100	172	72	63	1·14	77·15
4	Yorkshire (d) Tamworth (s)	84	150	66	60	1·10	78·67
5	Berkshire	98	165	67	62	1·07	80·00
6	Tamworth	83	148	65	54	1·20	81·09

PEN NO. 2.—Feed: 2 lbs. Pea Meal, 1 lb. Crushed Oats and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. of Days Fed.	Daily Gain.	Per cent Dressed Weight.
1	Yorkshire	97	160	63	60	1·05	81·25
2	Berkshire	110	184	74	58	1·27	81·58
3	Yorkshire (d) Berkshire (s)	105	190	85	63	1·34	80·00
4	Yorkshire (d) Tamworth (s)	84	167	63	60	1·05	77·85
5	Berkshire	99	178	79	62	1·27	78·66
6	Tamworth	70	164	74	54	1·37	79·27

PEN NO. 3.—Feed: 3 lbs. Wheat Shorts and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. of Days Fed.	Daily Gain.	Per cent Dressed Weight.
1	Yorkshire	90	164	74	60	1·23	78·05
2	Berkshire	83	160	77	58	1·32	78·13
3	Yorkshire (d) Berkshire (s)	107	171	64	63	1·01	77·20
4	Yorkshire (d) Tamworth (s)	80	147	67	60	1·10	81·64
5	Berkshire	102	132	70	62	1·12	78·49
6	Tamworth	74	150	76	54	1·40	78·67

PEN NO. 4.—Feed: 3 lbs. Buckwheat and Skim-milk.

No.	Breeding.	Weight at Start.	Weight at Finish.	Net Gain.	No. of Days Fed.	Daily Gain.	Per cent Dressed Weight.
1	Yorkshire	92	160	68	60	1·13	78·12
2	Berkshire	100	165	65	58	1·12	77·58
3	Yorkshire (d) Berkshire (s)	112	172	60	63	0·95	81·40
4	Yorkshire (d) Tamworth (s)	71	140	69	60	1·15	80·00
5	Berkshire	84	140	56	62	0·90	80·00
6	Tamworth	77	145	58	54	1·25	78·63

SHEEP.

The sheep on this farm are rather a poor lot, having been kept with the sole object of raising the fertility of a field of ten acres without an additional fertilizer, and for this reason many more sheep were kept on this field than would otherwise have been, and never having had any abundance of feed they have not made much improvement.

On the other hand, while this field only supported (and badly) 25 in 1898, it supported equally well 34 in 1899, and 42 in 1900, with a fair prospect of again supporting an increased number in 1901.

An estimate of the amount of food consumed in winter was made, and lambs were exchanged to the value of that amount; the wool was also exchanged for feed, which was fed to supplement the pasture through the summer. Two of the ten acres were sown with rape (Dwarf Essex) in June, and afforded excellent feed for the entire flock of 42 sheep from September 1 to October 15.

The flock at present consists of 42 sheep, 6 lambs and 1 Shropshire ram.

(s) Sire. (d) Dam.

POULTRY, 1899-1900.

Three varieties of fowls were kept this year. These are the Barred Plymouth Rocks, Black Minorcas and White Leghorns. The Barred Plymouth Rocks and Black Minorcas were practically all young birds, while the White Leghorns were old birds, except three of them, which were one year old.

The pens were made up as follows :—

No. 1.—10 Barred Plymouth Rock hens.

No. 2.—8 Black Minorca hens.

No. 3.—7 White Leghorn hens.

During the winter they were fed on a warm corn-meal mash in the morning, and whole grain in the afternoon, the whole grain being scattered on the floor of the pens. Water was before them all the time, and green ground bones and oyster shells were occasionally given them. After August 1 they were allowed the freedom of the fields.

The eggs laid during the year by the different breeds were as follows :—

No. 1.—10 Barred Plymouth Rocks	602
No. 2.—8 Black Minorcas	526
No. 3.—7 White Leghorns	307

The fowls now on the farm are :—

	Hens.	Pullets.	Cocks.	Cockerels.
Barred Plymouth Rocks	4	10	1	2
Black Minorcas	4	8	0	2
White Leghorns	5	1	0	1

BEES, 1899-1900.

On December 7, 1899, five colonies of bees, weighing respectively, 52 pounds, 28 pounds, 56 pounds, 40 pounds and 46½ pounds were put in their winter quarters in the cellar of the superintendent's house. They were kept at a temperature ranging from 32° to 40° all winter, and put out on their summer stands on May 2, 1900. The light weighing colony, No. 2, 28 pounds, died during the winter, the remainder coming out in fairly good shape. Their respective weights when put out in May were : 42 pounds, 46 pounds, 37 pounds and 32 pounds, being an average of 10 pounds lighter than when put in the cellar. This season was very unfavourable for honey gathering, the bees only gathered enough for self-support.

Three swarms were captured during July, one on the 5th, one on the 9th and one on the 22nd.

I have the honour to be, sir,
Your obedient servant,

R. ROBERTSON,
Superintendent.

REPORT OF THE HORTICULTURIST.

(W. S. Blair.)

To Dr. Wm. Saunders,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith a report of some of the work done in the horticultural department of the experimental farm for the Maritime Provinces for the year 1900.

From year to year a gradual improvement is noticed in the methods adopted in planting, cultivating, fertilizing and general care of fruit trees in these provinces. An opportunity was afforded during the month of July of visiting many fruit farms in the Annapolis and Cornwallis valleys, and of noting the effect of well directed effort alongside that of indifferent or careless practice. In this province we have, probably, never had a year when the effects of spraying and good cultivation have been so marked as during the past season, and seldom has so much inferior fruit been grown.

Generally speaking, apples were a large crop, and when well cared for the trees were able to produce a good quality of shipping fruit ; but, with an abundant fruitage, a lack of food and moisture, and in many instances with fungous growths unchecked, a surplus of inferior fruit was obtained in place of the high grade that all should have aimed to produce, if the export trade is to be maintained with the greatest advantage.

Those who cultivated, sprayed, and fertilized, have good fruit for market, and those who neglected their orchards, in proportion to the neglect have inferior fruit. The most successful fruit-growers consider cultivation as essential as fertilization, and during the month of June, July, and part of August, the harrow is kept constantly at work.

With an increase of apples the apple scab fungus, if unchecked, also increases The Bordeaux mixture, as a preventive of this, is beyond the experimental stage, and is now recognized by the most skeptical as a necessary part of orchard work, if the most profit is to be obtained.

The apple-tree tent-caterpillars were destructive in the Cornwallis and Annapolis valleys this year. In many cases they were checked by spraying ; some, however, allowed their trees to be defoliated, and others report little effect from spraying. There is no doubt but that this pest can be checked completely by the use of Paris green. The trees should be sprayed before they are in bloom, and the work done thoroughly. Where this was done the report is that the caterpillars were all killed. This pest has a good chance to grow during a considerable period when the trees are in blossom. The general feeling is that no Paris green should be used at this time, and as the custom with many is to put off spraying as long as possible, the result is that no Paris green is used before blossoms open, and by the time they have fallen a great amount of damage has been done. There is no doubt but that this pest is much harder to control after the caterpillars are well grown, but, if good Paris green is properly applied they will certainly be killed.

The plum crop over the three provinces was good, and mostly of good quality. The crop on Prince Edward Island was exceptionally large. Climatic conditions on the Island favour this fruit.

Cherries were a fair crop, pears medium, and strawberries, raspberries and blackberries rather above the average. The condition of the weather during strawberry ripening time favoured this crop.

The crop of small fruits, plums and apples at this farm were above the average.

Pears have as yet fruited little, and cherries were a medium crop.

The usual collection of annual flowers were this year grown. Many new varieties of dahlias, and sweet pease, were added, making a very fine display.

A large collection of perennial flowering plants was sent from the Central Farm at Ottawa. They were set in rows 3 feet apart each way. The collection of these plants now numbers over 300 varieties.

The ornamental trees and shrubs have, with few exceptions, made splendid growth. The list is gradually increasing with new ones added each year. The plum aphis has not been so bad this season as formerly. The apple aphis was noticed on some apple trees, but soon disappeared. Tobacco water and whale-oil soap was used and proved quite effective.

Experiments were this year conducted with a whitewash mixture to determine its value for removing the oyster-shell bark-lice from apple trees. It has been found difficult to completely rid some trees of this pest, and those infested were sprayed. Some were sprayed only twice and others as many as six times. Two sprayings are necessary to completely whiten the tree, and as soon as this was washed off the trees were again sprayed. The wash was completely effective on some trees and on others a few lice still remained and young were hatched this spring. It would appear from notes taken that the spray was much more effective when applied as soon as made. This work, while not entirely effective, was quite satisfactory.

I beg to acknowledge the receipt of the following donations : 1 Aylmer spray pump, from the Aylmer Iron Works, Aylmer, Ontario. Plants of the Jessie strawberry, from Mr. Everett Crosby, Brazil Lake, N.S. Plants of the Saunders strawberry, from Mr. J. C. Craig, Amherst, N.S., and apple scions, from Mr. A. C. Starr, Starr's Point, N.S.

APPLE ORCHARDS.

One hundred and sixty-two varieties of apples are now under test on the Nappan farm. The trees in orchard No. 1 where no protection is given are, generally speaking, not so thrifty and vigorous as those in orchard No. 2 where the trees are protected by a shelter belt of spruce on all sides.

Orchard No. 1.—This orchard has made splendid growth during the past season. The soil is a clay loam, on a heavy red clay subsoil, which has been under-drained. The trees were all manured in the fall of 1899 with stable manure, and this was worked in the following spring.

Thorough cultivation was given throughout the season by using the horse cultivator at intervals of a week or ten days until the middle of August. A strip of land 6 feet at each side of the trees was kept clean by this method, and the ground between was given up to grass, grain and hoed crops.

The trees are sprayed every season with Bordeaux mixture four times. The fruit has thus far been practically free from the apple scab fungus. The crop of fruit was fairly good the past season. The late varieties, however, did not mature very well. The early sorts had good colour and quality. The abundant fruitage of some varieties, with slow early spring growth, combined to make the crop somewhat inferior in size and quality.

Paris green is used in all the applications of Bordeaux mixture after the first early one. There is practically no damage from the codling moth or apple worm. Other insect pests have so far given little trouble, with the exception of the oyster-shell bark-louse, which is now, with the use of the lime spray, pretty well eradicated.

Orchard No. 2.—The trees put out in 1891, 1892 and 1893, in this orchard, were planted amongst the stumps. It was found difficult to clean up the land when set, so further work here was postponed until the field was stumped and worked up. In the spring of 1897 the balance of the orchard was set. In the winter of 1895 a number of the trees in the plantation were girdled so badly by mice that they were lost.

The soil is rather light loam, with a clay subsoil. It was under-drained in 1897. The trees have received complete fertilizer and muriate of potash, at the rate of 200 pounds of the former to 100 pounds of the latter per acre, during the past three years, and this fall the land is being manured with stable manure. The soil is naturally very poor. Buckwheat crops were taken off the land two years in succession, and pease have been sown for the past two years, to plough under as a green manure.

The trees are each year sprayed with Bordeaux mixture.

The date of planting, the number of trees growing, their general fruitfulness, character of growth and productiveness is given below. As varieties of fruit, some are found to be improperly named, and two such are not included in this list. Those trees set in 1899 were planted in the fall of the year, all of the other trees have been planted in the spring.

APPLE ORCHARD, No. 1.

Name of Variety.	Date of Planting.	Number of trees grown.	Character of growth.	When fruited and general fruitfulness.
Allen's Choice	1899	1	Strong..	
Aport	1889	2	" ..	1894-96-98-99-1900. Medium.
Ananasnoe	1889	2	" ..	1895-97-99. Medium.
Anisovka	1890	1	" ..	1895-97-99 1900. Medium.
Anis	1890	2	" ..	1894-95-96-97-98-99 1900. Abundant.
Alexander	1890	3	" ..	1894-96-97-99 1900. Few.
Autumn Strawberry	1895	2	Weak ..	
Benoni	1890	2	Strong..	1896-98-99 1900. Medium.
Blue Pearmain	1890	1	" ..	1897-99 1900. Few.
Blackwood	1889	2	" ..	1894-95-96-97-98-99 1900. Medium.
Bank's Gravenstein	1895-98	2	Weak ..	
Baldwin	1898	1	Fair ...	
Borovinka	1889	1	Strong..	1894-95-96-97-98-99 1900. Medium.
Bottle Greening	1891	1	" ..	
Boy's Delight	1899	1	Weak ..	
Buckingham	1895	1	Strong..	
Bellflower (Bishop Pippin)	1889-92	3	" ..	1896-98-99 1900. Few.
Blushed Calville	1895	1	" ..	
Ben Davis	1893	2	" ..	1896-97-98-99 1900. Abundant.
Belle de Boskoop	1897	1	Weak ..	
Canada Baldwin	1890	3	Fair....	1894-95-96-97-98-99 1900. Medium.
Canada Red	1890	2	"	1897-99. Few.
Cooper's Market	1895	2	"	
Crimean Bogdanoff	1895	1	Strong..	1900. Few.
Carolina Red June	1895	2	Fair....	
Colvert	1890-93	3	"	1895-97-99 1900. Few.
Duchess of Oldenburg	1890-92	7	"	1893-94-95-96-97-98-99 1900. Abundant.
Dominie	1895	1	Weak ..	
Fameuse	1890	4	Strong..	1894-96-97-98-99 1900. Medium.
Flory Belle	1894	1	" ..	
Fallawater	1899	2	Fair....	
Golden Reinette	1895	1	Strong..	1900. Few.
Golden Ball	1899	1	" ..	
Golden Russet	1890-92	4	" ..	1894-95-96-97-98-99 1900. Medium.
Gano	1898	1	" ..	
Golden White	1895	2	Fair....	
Gravenstein	1889-95	3	"	
Hibernal	1894-95	2	Strong..	1898-99- 1900. Medium.
Haas	1890	3	" ..	1892-93-94-95-96-97-98-99 1900. Abundant.
Jonathan	1890	3	Fair . .	1895-98 1900. Medium.
Keswick Codlin	1890	3	Strong..	1895-96-97-98-99 1900. Medium.

APPLE ORCHARD No. 1—*Continued.*

Name of Variety.	Date of Planting.	Number of trees grown.	Character of growth.	When fruited and general fruitfulness.
King of Tompkins Co	1893	2	Weak	
Kohl's Early	1899	1	Strong	
Lady Washington	1899	2	Weak	
La Rue	1898	2	Strong	
Longfield	1889	3	"	1893-94 95-96-98-99 1900. Abundant.
Munson's Sweet	1898	2	"	
Maiden's Blush	1890	3	Fair	1894-95-96-97-98-99 1900. Few.
Milding	1893	1	"	
McIntosh Red	1889	3	Strong	1899 1900. Few.
Mann	1889	2	Fair	1898 1900. Medium.
McMahan White	1897	1	Strong	
Northern Spy	1890	2	Fair	
Ontario	1890-98	3	Weak	1894-95-98-99 1900. Few.
Ostrakoff	1889	1	Strong	1894-95-96-97-98-99 1900. Medium.
Peach	1893-95	4	"	1898 1900. Few.
Princess Louise	1892	2	"	1900. Few.
Pewaukee	1890-92	5	"	1894.95-96-97-98-99 1900. Medium.
Peter	1898	2	Fair	
Peck's Pleasant	1895	1	Strong	
Rome Beauty	1895	2	"	
Rhode Island Greening	1890	3	Fair	1900. Few.
Red Astrachan	1890	5	Strong	1894-95-96-97-98-99 1900. Medium.
Red Russet	1899	1	"	
Roxbury Russet	1893-98	2	Fair	
Red Bietigheimer	1893	1	Weak	
Rambo	1890	2	Fair	1900. Few.
Ribston Pippin	1894	2	Weak	
Sops of Wine	1897	1	Strong	
St. Lawrence	1890	3	"	1897-99 1900. Medium.
Seek-No-Further	1895	2	"	
Sultan	1890	2	"	1894-95-96-97-98-99 1900. Abundant.
Spitzenburg	1894-98	3	Fair	
Serinka	1890	2	"	1898 1900. Medium.
Sweet Bough	1897	2	Strong	
Scott's Winter	1890	2	"	1893-94-95-96-97-98-99 1900. Abundant.
Shannon	1897	1	"	
Trenton	1893	1	"	1896-97-98-99 1900. Abundant.
Tetofsky	1890	1	Weak	1894-95-96-97-98-99 1900. Medium.
Titovka	1889	2	Strong.	1894-95-96-97-98-99 1900. Abundant.
Twenty Oz. Pippin	1893-98	2	"	
Walbridge	1893-98	2	Weak	1900. Few.
Wellington	1893	2	Strong	1897-98-99 1900. Abundant.
Wagener	1890-92	2	Weak	1894-95-96-97-98-99 1900. Few.
Wolf River	1898	2	Strong	
Wealthy	1890-97	3	"	1893-94-95-96-97-98-99 1900. Medium.
Grimes' Golden	1890	3	Fair	1895-96-97-98-99 1900. Medium.
Royal Table	1895	1	Strong	1900. Few.
Pewaukee Russet	1895	1	"	
Talman's Sweet	1890	2	"	1894-95-96-97-98-99 1900. Medium.
Yellow Transparent	1890	5	Fair	1893-94-95-96-97-98-99 1900. Abundant.

ORCHARD NO. 2.

American Blush	1899	1	Strong	
Antonovka	1897	2	"	
Avenarius	1897	2	"	
Atkison	1897	2	"	
Arabka Winter	1897	2	"	
Arabskoe	1897	2	"	
Beautiful Arkad	1897	2	"	
Bell Pippin	1897	2	"	
Bank's Gravenstein	1898	2	Fair	
Blushed Calville	1897	1	Strong	
Brownlee's Russet	1897	2	"	
Bethel	1898	2	"	

ORCHARD No. 2—*Continued.*

Name of Variety.	Date of Planting.	Number of trees growing.	Character of growth.	When fruited and general fruitfulness.
Blenheim Pippin	1897	1	Strong..	
Basil The Great	1897	2	" ..	
Babbit	1897	1	Weak ..	
Blue Pearmain	1890	1	Strong..	
Belle de Boskoop	1897	1	" ..	
Ben Davis	1897	1	" ..	
Bismarck	1899	1	Fair....	
Cross	1897	2	Strong..	
Charlottenthaler	1898	2	" ..	
Cinnamon Pine	1895	2	" ..	
Canada Reinette	1897	1	" ..	
Cox's Pomona	1897	2	" ..	
Duchess	1893	1	" ..	1898-99 1900. Medium.
Derby	1890	2	" ..	1900. Few.
Danver's Winter Sweet	1897	2	" ..	
Enormous	1897	1	" ..	
Early Colton	1897	1	" ..	
Fanny	1897	2	" ..	
Fameuse	1893	1	" ..	1898-99 1900. Medium.
Fallawater	1898	1	Weak ..	
Golden Sweet	1897	1	Strong..	
Grimes' Golden	1890	1	" ..	1899 1900. Medium.
Golden Russet	1892	1	" ..	1899 1900. Few.
Gravenstein	1893	1	" ..	
Gano	1897	2	" ..	
Golden Reinette	1897	1	" ..	
Grandmother	1897	2	" ..	
Headley	1897	2	" ..	
Hastings	1892	1	" ..	
Hurlbut	1897	2	" ..	
Jonathan	1899	1	" ..	
Jefferis	1897	1	" ..	
King	1898-99	3	" ..	
Long Arkad	1897	2	" ..	
Little Hat	1897	1	Fa r....	
Inkerman Greening	1899	2	Strong..	
Melonen	1897	1	" ..	
Mother	1897	2	" ..	
Missouri Pippin	1897	2	" ..	
Mammoth Pippin	1899	2	" ..	
Munson's Sweet	1897	2	" ..	
Northwestern Greening	1897	2	" ..	
Newton Pippin	1897	1	" ..	
Northern Spy	1892-98	3	" ..	
Newell's Winter	1897	1	" ..	
Ontario	1897	1	" ..	
Occident	1897	2	" .	
Pipka Winter Bogdanoff	1897	1	" ..	
Porter	1897	2	" ..	
Pomme Grise	1897	2	" ..	
Palmer Greening	1897	2	" ..	
Patten's Greening	1897	2	" ..	
Peck's Pleasant	1898	2	" ..	
Pudky	1899	2	" ..	
Pewaukee	1891	2	" .	1898-99 1900. Medium.
Pointed Pipka	1896	4	" ..	
Renaud's Seedling	1897	2	" ..	
Russian Tyrol	1895	1	" ..	1900. Abundant.
Red Russet	1897-99	2	" ..	
Red Astrachan	1893	1	" ..	1900. Few.
Ribston Pippin	1897-99	4	Fair.. .	
Sops of Wine	1897	1	Strong..	
Shannon	1897	1	" ..	
Salome	1898	2	" .	
Sunbeam	1897	1	" ..	
Silken Leaf	1897	2	" ..	
Sutton's Beauty	1897	1	" ..	

ORCHARD No. 2—*Concluded.*

Name of Variety.	Date of Planting.	Number of trees growing.	Character of growth.	When fruited and general fruitfulness.
Smith's Cider	1897	1	Fair	
Summer Rose	1897	1	Strong.	
Shiawassee Beauty	1897	2	"	
Swaar	1897	2	"	
Tulpehocken	1900	2	Fair	
Tufts' Baldwin	1897	1	Strong	
Twenty Oz. Pippin	1898	1	"	
Uncle Sam	1897	1	"	
Vandevere	1899	1	Fair	
White Pigeon	1897	2	Strong	
Wisner's Desert	1899	2	"	
Watterson	1897	2	"	
Western Beauty	1897	2	"	
Windsor Chief	1897	2	"	
Wealthy	1899	2	"	
Winesap	1897	2	"	
Williams' Favourite	1897	2	"	
White Astrachan	1891	2	"	1896-97-98-99 1900. Abundant.
Winter Bough	1890	3	"	1900. Few.
Wagener	1898	1	Weak	
Walbridge	1898	1	Fair	
Yellow Transparent	1892	1	Strong	1896-97-98-99 1900. Medium.
Hibernal	1897	1	"	
Stump	1898	1	Fair	
York Imperial	1897	1	Strong	

CRAB APPLES.

Nine varieties of crab apples are growing. Some information is given below bearing on their general growth. They are on land adjoining apple orchard No. 1, and have received the same treatment.

CRAB APPLES.

Name of Variety.	Date of Planting.	Number of trees growing.	Character of growth.	When fruited and general fruitfulness.
General Grant	1892	2	Strong	1895-96-97-98-99 1900. Medium.
Hyslop	1890 93	5	"	1893-94-95-96-97-98-99 1900. Abundant.
Leslie's Sweet	1897	2	Fair	
Montreal Beauty	1990-93	5	Strong	1893-94-95-96-97-98-99 1900. Abundant.
Martha	1893	2	"	1895-96-97-98-99 1900. Medium.
Power's Red	1896	1	Fair	1900. Medium.
Transcendent	1890-93	5	Strong	1894-95-96-97-98-99 1900. Abundant.
Van Wyck	1895	1	"	
Whitney	1890	1	Fair	1893-94-95-96-97 98-99 1900. Medium.

PLUMS.

Sixty-seven varieties of plums are now under test. These have made exceptionally good growth the past year, and some of the varieties fruited well this season.

It has been very difficult during the past five years to keep the trees completely free from the plum aphis. These insects commence operations about the middle of July and continue until September. The difficulty in treating this pest is to kill them all, which seems almost impossible, as they suck the juices of the plant from the under side of the leaf, which soon causes the leaf to curl, thus protecting the insects from a spray. Tobacco water and whale-oil soap are used for spraying. Ten pounds of the tobacco to a cask of water, soaked twenty-four hours, and two pounds of whale-oil soap added is a very effective mixture. The trees must be constantly watched and repeated sprayings given to keep this insect in check.

This season the plum aphis was not nearly so bad as formerly, and it is hoped that these insects will soon disappear, as even with careful attention, the trees suffer more or less injury from them.

In the fall of 1898 black knot broke out on a great number of trees, making it necessary in many cases to remove the entire tree. This had previously given no trouble here, and the few knots which had appeared heretofore were promptly removed before ripening.

One end of this orchard is a very heavy red clay, and on this considerable loss has occurred. The trees on this soil do well for a few years and will then winter-kill at the roots. The tips of some branches have winter-killed, but not sufficient to cause any damage to the tree.

This orchard is lacking in protection which seems to be necessary for successful plum-growing. The following varieties are now under trial :—

PLUMS.

Name of Variety.	Date of Planting.	Number of trees growing.	Character of growth.	When fruited and general fruitfulness.
Arch Duke	1895	2	Fair	
Bryanston's Gage	1897	2	"	
Baker's Prune	1899	1	Strong	
Black Hawk	1899	1	Fair	
Abundance	1895	1	"	
Burbank	1895	1	Strong	1900, few.
Bradshaw	1892-99	2	Fair	
Botan	1897-99	4	Strong	
Coe's Golden Drop	1891	2	Fair	1900, abundant.
Cheney	1897	2	Strong	
Columbus	1900	2	"	
De Soto	1900	2	Fair	
Duane's Purple	1892	2	"	
Damson	1891-99	3	"	1898 and 1900, abundant.
Grand Duke	1895-1900	3	Strong	
Goliath	1897	2	Fair	
Gueii	1891-93	3	Strong	1900, abundant.
German Prune	1892-99	4	"	1900, few.
Glass Seedling	1900	2	"	
Hawkeye	1899	1	Fair	
Hudson River Purple Egg	1900	2	Strong	
Imperial Gage	1891-93	7	"	1900, abundant.
Italian Prune (Fellenberg)	1893-97	4	"	1900, medium.
James Vick	1899	1	"	
Jefferson	1900	1	"	
Kennedy's Red	1899	1	Weak	
Lambert's Red	1899	1	Fair	
Lombard	1891-99	6	Strong.	1898-99 and 1900, medium.
Luscombe's Nonesuch	1897	2	Weak	
Lawrence's Favourite	1891	1	Fair	
Large Red Sweet	1899	1	"	
Leonard	1899	1	"	
Moldavka	1899	1	Strong	
Moore's Arctic	1892-99	4	"	1897-98-99 and 1900, abundant.
Mariana	1899	1	"	
McLaughlin	1900	2	Fair	
Mereton's Egg	1899	1	"	
Monarch	1900	2	Strong	
Niagara	1899	2	"	
Ogon	1897	1	Fair	
Old Gold	1899	2	"	
Orange	1897	1	"	
Oullin's Golden	1897	2	"	
Prince of Wales	1895	2	Strong	
Pond's Seedling	1892	2	Fair	1900, few.
Prince Englebert	1900	2	"	
Prince's Yellow Gage	1892 1900	6	Strong	1900, abundant
Quackenboss	1897	2	"	
Reine Claude	1891	2	"	
R. B. Whyte's New Seedling	1899	1	Fair	
Reine Claude de Montmorency	1899	1	"	
Red Egg	1900	2	Strong	
Richard	1899	1	"	
Rochford	1899	1	"	
Stoddard	1899	1	"	
Sophie	1899	1	"	
Shipper's Pride	1892	2	"	1898-1900, medium.
Smith's Orleans	1898-1900	3	Fair	
Saunders	1893-1900	3	"	
St. Lawrence	1897	2	Weak	
Victoria	1897	2	"	
Weaver	1897	1	Fair	
Washington	1892-93	3	Strong.	
Wickson	1900	2	"	
Yellow Moldavka	1899	1	Fair	
Yellow Egg	1898-1900	3	Strong	
Rollingston	1899	1	Fair	

CHERRIES.

Forty varieties of cherries are now growing here. They are planted 18 feet apart each way. They have received good cultivation, and the trees generally have made strong growth. Considerable loss has occurred from trees dying the following winter after heavy fruitage. The varieties Dyehouse, Montmorency, Governor Wood, Lieb, Napoleon, and Coe's Transparent, planted in 1892, have nearly all died in this way. Some varieties have been lost through the bark at the base of the trunk decaying, also from the bark splitting and curling, causing it to separate from the wood.

Some excellent specimens of the above varieties have been grown. The variety Early Richmond has fruited very little. The only insect so far encountered is the pear, or cherry-tree slug (*Selandria cerasi*), which has not been noticed on the pears, but which each year infests the cherry trees. It is easily destroyed by spraying with Paris green and water—4 ounces of the poison to 40 gallons of water. A large number of cherry trees throughout the Maritime Provinces have been killed by this cherry-tree slug, which eats all of the green part of the leaf, after which the tree looks as if it had been scorched by fire. This insect makes its appearance about the middle of June, and should be attended to promptly.

CHERRIES.

Name of Variety.	Date of Planting.	Number of trees now growing.	Character of growth.	When fruited and general fruitfulness.
Archduke	1897	2	Strong	
Black Eagle	1900	3	"	
Bessarabian	1899	1	"	
Belle Magnifique	1895	2	"	
Black Heart	1892	1	Fair	
Carnation	1897	1	Strong	
Coe's Transparent	1892	1	"	1899-1900, abundant.
Downer's Late Red	1899	1	"	
Dyehouse	1895	2	"	
Early Purple Guigne	1900	2	Fair	
English Morello	1892-93	4	Strong	1894-95-97-98 and 1900, abundant.
Early Richmond	1892	7	"	1895-97-98 and 1900, few.
Griotte Morello	1899	1	Fair	
Governor Wood	1892-98	3	"	1896-97-98-99 and 1900, medium.
Gruner Glass	1895	2	Strong	1898-99 and 1900, medium.
Knight's Early Black	1898	2	Weak	
Lithaur Weichsel	1898	2	Strong	
Lieb	1898	1	"	1900, few.
Late Duke	1892-97	2	Fair	
Montmorency Ordinaire	1898	1	Strong	
Mezel	1899	1	"	
May Duke	1895-99	3	"	
Montmorency	1892-93	4	"	1898-1899, medium.
Napoleon	1900	2	"	
Ostheim	1892	1	"	1896-98 and 1900, abundant.
Ohio Beauty	1895	2	"	
Orel	1893-95	3	"	1898-99 and 1900, abundant.
Olivet	1892	2	"	1895-96-98 and 1900, abundant.
Reine Hortense	1897-99	2	"	
Rockport	1895	1	Fair	
Royal Duke	1897	1	"	
Schmidt	1897	2	Strong	
Sparhawk's Honey	1897	2	Fair	
Shadow Amarelle	1893	2	Strong	1899 and 1900, medium.
Spate Amarelle	1895	1	"	1899 and 1900, medium.
Tradescant's Black Heart	1897-98	2	"	
Vladimir	1895	2	"	
Wragg	1892	2	Fair	1895-96-97-98 and 1900, abundant.
Windsor	1892-93	3	Strong	1900, abundant.
Yellow Spanish	1892	1	Fair	

PEARS.

Thirty-two varieties of pears are now growing in the orchard. These are making fair growth. A very large proportion of the pear trees planted in 1892 and 1893, were lost through pear blight (*Micrococcus amylivorus*). This was first noticed in 1896, and by the following season two-thirds of the orchard was destroyed. All of the affected trees have been removed.

The soil on which these trees are planted is a heavy clay loam, under drained. The trees are kept cultivated. The season and soil does not seem favourable to this fruit. The trees are planted 18 feet apart each way. The following are the varieties under test here :—

PEARS.

Name of Variety.	Date of Planting.	Number of trees now growing.	Character of growth.	When fruited and general fruitfulness.
Beurre Clairgeau	1899	4	Strong	
Beurre d'Anjou	1893-99	4	Fair	
Beurre Hardy	1898 99	2	"	
Bezi de la Motte	1897	2	"	
Bartlett-Seckel	1898	1	"	
Bartlett	1892-99	4	Weak	
Bessemianka	1895-97-99	4	Strong	
Buffum	1890	2	Fair	
Clapp's Favourite	1892-95-97	6	"	
Duchesse d'Angouleme	1893-99	3	"	
Doyenne Boussock	1897-99	3	"	
Dempsey	1899	2	"	
Dr. Reeder	1892-97	2	Strong	
Flemish Beauty	1892-99	1	"	1899 and 1900.
Goodale	1900	1	Fair	
Giffard	1900	1	"	
Howell	1900	2	"	
Josephine	1900	2	"	
Kieffer	1895 99	3	Strong	
Louise Bonne de Jersey	1899	2	Fair	
Longworth	1897-98	2	"	
Lawrence	1892	1	Weak	
Matilda	1897	2	Strong	
Mount Vernon	1893	1	Fair	
Seckel	1899	2	"	
Souvenir du Congress	1900	2	"	
Sheldon	1892-93	2	"	
Tyson	1892 95	3	Strong	1899 and 1900.
Onondago	1900	2	Fair	
Osband's Summer	1895	2	Strong	
Vermont Beauty	1895-99	3	"	
Wilder	1899	1	Fair	

EXPERIMENTS WITH STRAWBERRIES.

Experiments to test the relative value of different sorts of strawberries were this year continued. The plants were planted so as to cover 99 square feet when the runners have become established. In order to do this, two rows are set 3 feet apart and 16½ feet long. The plants are put out 1 foot apart in the rows. The runners between these rows fill up the entire space, and are also allowed to run 1½ feet on the outside of the rows. This makes the plot 6 feet wide by 16½ feet long of matted plants. A space of two feet is left between each plot.

Strawberries grown on this matted row system have given good crops here. In field culture the rows should be put 4 or 4½ feet apart, as this would leave a space of 1 or 1½ feet wide for picking the fruit. The plants should be set 18 inches apart in field culture.

After the plants are set, the horse cultivator should be used to stir the ground as close to the plants as possible during their early growth, and gradually the space worked by the cultivator may be narrowed as the runners start out and young plants are produced. It is a good practice to go over the rows after the runners have partly grown, and place them so as to fill all vacant spaces without crowding. A little care at this juncture will increase the yield of fruit on the plot.

Hand hoeing should be carefully attended to, and no weeds allowed to grow. All weeds should be carefully hoed out in the late summer, and the patch kept clean well into fall, for the damp fall weather favours the growth of many sorts of weeds.

If the plantation has been kept clean the first season, it is possible to obtain two fruit crops, but, if not, the plantation should be ploughed up after the first crop is taken off. It is much cheaper to reset a new plantation every year than to clean the weeds out of one which has been neglected during the season after planting.

Spring planting has been found to be the most successful here. Those plants set in the fall are liable to winter-kill unless started very early, and it is difficult to obtain young plants, far enough advanced, to put out in time to get well established before winter comes.

Fall-set plants produce but a limited amount of fruit the next season, and hence one is very little farther ahead with fall-set plants than with those put out the next spring.

Plants for setting should be handled so that their tops will not wilt. In order to prevent this the roots must be kept moist, and the plants sheltered from drying winds as much as possible. Plants that have wilted should be 'puddled' in a mixture of water, and heavy soil, mixed to the consistency of thick paint, before planting. The roots, if dipped in this, will be coated with a thin layer of moist soil, which will preserve them from drying.

Set the plants so that the crown will be level with the ground after it is settled.

Strawberries should be planted on soil well enriched, by using stable manure. If the ground has previously been used for a hoed crop, manure again in the fall after the crop is removed and plough under, and work up again in the spring before planting. A good plan is to scatter complete fertilizer along the rows before planting, which is worked in when setting the plants. About twenty-five one-horse cartloads of barn-yard manure should be used per acre.

The dates of picking, and the quantity of fruit obtained each day, are given in the following table ; also, the total yield per plot for the past three crops. One crop only is taken from a plot ; they were after that ploughed under. The soil is a heavy clay loam, which makes the ground difficult to keep clean and in good tilth by any other method.

Four varieties were also grown in the hill system. Two rows, 3 feet apart, were set, the plants being 1 foot apart in the rows, and at each side of these a row of plants were put out so that four plants would make the corner of a square, the plants all being 1 foot apart each way. The runners were kept cut off all of these plants, and only the plants set allowed to grow. The yield from these was greatly below that of those grown in matted rows, and the fruit was not nearly so clean, being considerably damaged with sand.

Generally speaking, strawberries will not winter without some protection. From 1 to 2 inches of clean straw makes a good covering which should be put on the latter part of November, after the ground is nicely frozen. Spruce boughs have also proved quite satisfactory as a protection.

STRAWBERRIES.

Name of Variety.	Sex.	Date of Picking. July 11. Lbs.	Oz.	July 13. Lbs.	Oz.	July 17. Lbs.	Oz.	July 19. Lbs.	Oz.	July 23. Lbs.	Oz.	July 26. Lbs.	Oz.	July 30. Lbs.	Oz.	1900. Total yield from Plot of 99 sq. feet. Lbs.	Oz.	1899. Total yield from Plot of 99 sq. feet. Lbs.	Oz.	1898. Total yield from Plot of 99 sq. feet. Lbs.	Oz.
Brandywine	B	..	..	2	..	..	..	8	..	6	8	3	8	..	..	20	..	11	9½	8	6
Bisel	P	..	9	1	12	3	12	4	2	9	8	6	6	2	12	28	13	32	7½	12	12½
Beverly	B	..	..	1	..	2	2	4	15	8	9	3	..	5	2	24	12	19	5½	9	2½
Beder Wood	B	4	..	4	9	11	2	..	..	6	9	1	8	1	..	28	12	31	8½	15	½
Barton's	P	1	..	.	13	6	2	4	..	9	4	3	14	2	2	27	3	24	2½	9	15½
Bubach	P	1	2	1	2	5	9	3	6	6	11	2	13	1	2	21	13	18	9	12	13
Captain Jack	B	..	..	3	6	7	8	..	..	10	9	7	12	2	5	31	8	17	5	16	2½
Clark's Early	B	..	..	1	2	4	7	3	4	2	..	..	..	..	..	10	13	11	5½	7	10½
Chairs	B	..	..	6	..	4	1	4	..	3	13	2	4	..	..	20	2	15	12	14	7½
Crescent	P	1	8	4	8	14	3	5	4	10	5	..	..	4	..	39	12	39	9	22	14½
Enhance	B	1	2	1	..	3	6	2	5	8	14	2	5	3	6	22	6	13	9½	11	4½
Equinox	B	..	..	..	..	..	..	1	6	3	13	3	4	3	9	12	..	17	4	9	6½
H. W. Becher	B	2	..	2	12	7	4	5	8	7	12	2	2	1	13	29	3	37	3	31	15
Haverland	P	..	..	1	2	5	9	..	..	9	7	3	6	3	1	22	9	22	8½	9	9
Jas. Vick	B	..	..	..	..	7	4	..	..	7	12	2	5	3	6	20	11	21	9	21	11½
John Little	B	2	4	3	6	8	1	..	..	7	12	2	5	1	2	24	14	22	3	17	2½
Leader	B	1	..	4	..	6	4	7	6	7	6	..	..	2	2	28	2	7	4	4	6½
Otsego	P	..	..	..	..	1	2	3	..	7	9	3	..	3	10	18	5	14	6½	10	13
Pearl	B	1	14	3	..	5	10	3	..	4	14	1	8	1	8	21	6	19	6	13	1½
Paris King	B	1	5	2	13	5	4	..	..	8	9	3	9	2	..	23	8	4	7½	7	11
Parker Earle	B	1	13	4	12	10	..	4	13	7	5	7	12	1	8	37	15	21	5	13	15½
Shirts	B	..	..	..	..	..	..	..	..	6	4	4	6	3	7	14	1	15	2	14	9
Sharpless	B	1	1	1	2	3	..	2	12	6	15	2	9	3	..	20	7	17	7	15	5
Swindle	B	..	..	1	2	3	2	2	10	4	2	4	8	3	12	19	4	28	8	10	7
Seneca Queen	B	..	13	1	5	6	2	5	..	7	4	2	3	1	15	24	10	17	14	4	2
Thompson's Late	P	4	1	4	12	3	5	..	..	1	15	..	..	..	..	14	1	9	15	2	2
Wm. Belt	B	..	..	1	2	..	..	1	8	3	..	1	8	1	8	8	10	14	4½	13	
Warfield No. 2	P	2	2	5	2	9	..	5	15	14	12	..	..	4	8	41	7	40	..	7	6½
Wilson	B	1	4	3	7	..	..	10	..	3	7	2	8	..	..	20	10	21	4	12	12
Williams	B	..	3	1	.	5	4	5	2	6	12	4	12	5	..	28	1	19	15½	13	12
Woolverton	B	2	5	4	..	12	4	..	..	11	15	5	2	1	9	37	3	21	14	2	15½
Lovett	B	1	2	2	5	8	..	6	..	4	13	3	8	2	4	28	..	35	13		
Mary	P	..	..	..	..	4	8	..	..	6	6	3	..	3	6	17	4	22	4		
Gandy	B	..	..	1	5	3	8	..	..	8	..	3	2	2	5	18	4	19	6		
Eureka	P	..	..	2	..	1	4	3	4	5	12	2	..	5	1	19	5	21	13		
Greenville	P	1	5	2	4	3	15	5	2	4	8	3	4	1	8	21	14	17	4	9	6½

EXPERIMENTS WITH STRAWBERRIES GROWN IN HILLS AND ROWS.

Name of Variety.	How Planted.	Date of Picking. July 11. Lbs.	Oz.	July 13. Lbs.	Oz.	July 17. Lbs.	Oz.	July 19. Lbs.	Oz.	July 23. Lbs.	Oz.	July 26. Lbs.	Oz.	July 30. Lbs.	Oz.	1900. Total yield from Plot 99 sq. ft. Lbs.	Oz.
Crescent	Rows	1	8	4	8	14	3	5	4	10	5	..	....	4	.	39	12
"	Hills	....	....	3	2	6	12	1	15	4	1	2	.	1	1	18	15
H. W. Becher	Rows	2	.	2	12	7	4	5	8	7	12	2	2	1	13	29	3
"	Hills	1	8	2	2	5	4	3	.	5	2	1	9	.	14	19	7
Bisel	Rows	.	9	1	12	3	12	4	2	9	8	6	6	2	12	28	13
"	Hills	....	....	2	4	6	.	3	15	6	8	4	14	2	4	25	13
Beder Wood	Rows	4	.	4	9	11	2	....	....	6	9	1	8	1	.	28	12
"	Hills	....	....	3	2	2	15	1	4	....	....	.	15	....	....	8	4

EXPERIMENTS WITH RASPBERRIES.

Ten varieties of raspberries are under test. These are set in rows 6 feet apart, and 33 feet long. Each plot is one row, 33 feet long. The canes are kept cut to cover a space of ground 1 foot wide along the entire row. They were planted in the spring of 1897. The soil is a heavy clay loam. The rows were manured in the fall of 1899, and the manure worked in the following spring.

These plots have, so far, only fruited lightly. The raspberry Anthracnose (*Gloesporium venetum*) has greatly troubled the raspberries here. It was imported on some canes of the black raspberry, and quickly spread. The canes that have fruited are cut out as soon after as possible. This, together with spraying with diluted Bordeaux mixture, i.e., 3 pounds copper sulphate, 3 pounds lime, to 40 gallons of water, has greatly reduced this disease. The old canes are sprayed in the early spring, before the leaves are opened ; the young canes, when 4 inches high, and after this for two sprayings, at intervals of two weeks. All of the sprayings after the first one should be directed to the young canes only, as it is of no value, but rather an injury, to the fruiting canes. Of course, necessarily, some Bordeaux will fall upon the old canes, but the work can be done so that the base of the old canes will only be touched with Bordeaux, and not the upper leaves. This work must be done early to be effective.

This disease has been noticed in many respberry plantations. The following points will enable one to detect it. The old canes are more or less blotched with dead tissue of a dark brownish colour. The fruit does not fill out well, and dries up. The leaves curl and fall prematurely. The young canes, when about 1 foot high, will appear more or less covered with small reddish-purple spots around the base. This quickly increases in size, the centre of the spots turn to a grayish-white, and the margin retains its purplish colour. As the growth continues, more small spots are noticed further up the cane. The leaves are also attacked by this fungus.

The yield from the raspberry plots during the past year has been as follows :—

Name of Variety.	Season of Picking.	Yield per Plot of 33 feet. Lbs.	Oz.
Red—			
Marlboro	July 21 to Aug. 16	30	14
Miller's Red	" 21 " 8	18	9
Loudon	" 21 " 8	19	
Turner	" 21 " 16	17	2
Cuthbert	" 28 " 16	16	
Hansell	" 21 " 3	11	12
White—			
Golden Queen	" 21 " 16	20	2
Black—			
Older	" 21 " 8	12	9
Purple—			
Columbian	" 21 " 8	11	15
Shaffer's Colossal	" 21 " 8	10	12

DESCRIPTION OF VARIETIES.

Cuthbert.—Canes strong, vigorous, quite hardy, and suckers freely. It produces fruit of large size, good quality, and firm. It is one of the best varieties, and for shipping purposes stands ahead of most others. The Marlboro is more prolific here, and fruits earlier. This variety follows as a later market sort.

Marlboro.—Vigorous growing canes, quite hardy and suckers freely. The fruit is large, firm, and of fair quality. This is a good early market sort, is a fine-looking fruit, and stands shipment well.

Loudon.—This variety is quite productive, growth vigorous ; fruit of medium size, and of good quality. Canes strong, quite hardy. Would probably stand shipping well.

Turner.—A strong vigorous grower, canes sucker freely. The fruit is of medium size, and of fair quality, but too soft for distant shipment. It is a very hardy sort, and succeeds where Cuthbert and Marlboro winter-kill.

Miller's Red.—A strong, vigorous grower, and quite productive. Fruit large, quality good, quite firm enough to ship well. Season about with the Marlboro'.

Hansell.—Growth fairly vigorous ; fruit soft, small, quality good. Has not done well here.

Older.—This is a vigorous-growing variety, producing large fruit of excellent quality. The fruit is firm, and stands shipment well. This is one of the best of the black-caps.

Columbian.—The canes are hardy, vigorous, and quite prolific. The fruit is very large, purple, of fair quality, and fairly firm. This fruit is of special value for canning purposes.

Shaffer's Colossal.—This is rather more vigorous than the Columbian. The fruit is large, and the quality fair. It is also firmer than the Columbian, and is valuable for canning.

Golden Queen.—A good yellow sort. The fruit is quite firm, and of good quality. and stands shipment fairly well. The canes are vigorous, quite hardy, and prolific. This variety, with Cuthbert, Marlboro, Shaffer's Colossal and Older, should be in every collection.

EXPERIMENTS WITH GARDEN PEASE.

Eighty-two varieties of garden pease were planted May 17, in rows 4 feet apart. There were two plots of each variety. One plot was pulled and the quantity of marketable green pease with pods weighed. The other was allowed to ripen and the quantity of ripened seed obtained. The seed was planted 1½ inches deep and 2 inches apart in the rows. Each plot was one row 66 feet long.

The land had tomatoes on it as a previous crop. It had no manure for that crop, but was manured the previous year for vegetables. It was ploughed in the fall of 1899 and worked up in the spring of 1900, with the spring-tooth harrow. Fertilizer at the rate of 150 pounds per acre was scattered along the rows, before the seed was planted, and worked in when covering the seed.

The Pea Aphis (*Nectarophora destructor*) was again troublesome. It appeared about July 29, but remained only a short time, and did not do nearly as much damage as it did last season.

The following yields were obtained, and notes taken of the character of growth :—

Garden Pease—Test of Varieties.

Name of Variety.	Length of Vine.	Length of Pod.		Date when Pulled and Pounds of Marketable Pease with Pods, per Plot.				Total Yield of Marketable Pease, per Plot.	Yield of Ripened Seed per Plot.
	Inches.	Inches.			Lbs.		Lbs.	Lbs.	Lbs.
Sunol	31	2¼ to	2½	July 20,	10¾	July 28,	9¼	20	8½
Alaska	33	2¼	2½	" 20,	8¼	" 28,	5	13¼	5½
Station	34	2½	2¾	" 20,	10¾	" 28,	4¼	15	5¼
New Maud S.	40	2¼	2½	" 20,	6¼	" 28.	22½	28¾	8¼
Bergin Fleeting	36	2½	2¾	" 20,	7	" 28,	11¼	18¼	5
Gradus	18	3	3¾	" 20,	8½	" 28,	4	12½	4½
Nott's Excelsior	18	2½	2¾	" 20,	8½	" 28,	20¾	29¼	6¼
Extra Early Pioneer	32	2	2¾	" 20,	11¼	" 28,	12	23¼	8½
Philadelphia	36	2¼	2¾	" 20,	9½	" 28,	11¼	20¾	5
American Wonder	17	2½	2¾	" 20,	9¼	" 28,	10¾	20	6
Exonian	34	2½	2¾	" 20,	12½	" 23,	10¾	23¼	6½
Rural New Yorker	35	2¼	2½	" 20,	10¾	" 28,	15¾	26½	7¼
Gregory's Surprise	36	2¼	2¾	" 20,	15¼	" 28,	6¾	22	6¼
Cleveland's First and Best	36	2¼	2½	" 20,	14¼	" 28,	11¾	26	8¼
Thorburn's Early Market	34	2	2½	" 20,	12½	" 28,	14½	27	8½
Imp. Ex. Early Daniel O'Rourke	35	2	2½	" 20,	11¼	" 28,	17¾	29	8¼
Extra Early Star	36	2¼	2½	" 20,	16¾	" 28,	12	28¾	8¼
Tom Thumb	24	2¼	2¾	" 20,	8¼	" 28,	13	21¼	7¼
Ameer	40	3	3¼	" 20.	8½	" 28,	16½	25	6
S. B. & M. Co's Extra Early	36	2½	2¾	" 28,	14¾	Aug. 1,	9¼	24	7¼
Mill's First of All	40	2	2½	" 28,	15½	" 1,	4½	20	5¾
Chelsea	18	2¾	3	" 28,	16	" 1,	4¼	20¼	6¼
Dwarf Wrinkled Sugar	18	2½	2¾	" 28,	15¼	" 1,	7¾	23	6¼
Hancock	40	2½	3	" 28,	19½	" 1,	16½	36	6½
Early Dexter	28	2¼	2¾	" 28,	17¼	" 1,	15¾	33	7¾
Premium Gem	24	2½	3	" 28,	16	" 1,	21½	37½	8¾
Early Frame Improved	41	2½	3	" 28,	17¾	" 1,	16¼	34	8½
Early May Improved	45	2½	3	" 28,	16¼	" 4,	21¾	38	8¼
Early Kent	40	2½	3	" 28,	12¼	" 1,	11¾	24	8½
Blue Beauty	30	2½	3	Aug. 2,	11½	" 6,	23½	35	8¾
Simmer's First of All	41	2½	3	" 2,	23½	" 6,	11¼	34¾	6¼
Kentish Invicta	45	2	2½	" 2,	12	" 6,	16¼	28¼	9¾
Ringleader	36	2½	3	" 2,	16½	" 6,	8¼	24¾	7¾
Alpha	45	2¾	3	" 2,	13½	" 6,	14½	28	6½
Blue Peter	12	2½	2¾	" 2,	12¼	" 6,	11½	23¾	6¾
Carter's Up-to-Date	41	3½	4	" 2,	28½	" 6,	12½	41	7¼
Petit Pois or Small French	36	2½	3	" 2,	21½	" 6,	18	39½	6¾
McLean's Little Gem	34	2½	3	" 2,	22¼	" 6,	16	38¼	9½
Laxton's Alpha	36	2¾	3	" 9,	21½	" 15,	21	42½	8½
Dwarf Telephone	18	3	3½	" 9,	18½	" 15,	14¼	32¾	5¼
Stanley	40	3½	4	" 9,	26¼	" 15,	12½	38¾	10¼
New Giant Podded Marrowfat	30	3	4	" 9,	20¼	" 18,	18¾	39	9¼
Boston Wrinkled	35	2½	3	" 9,	20	" 18,	20¾	40¾	7¾
Profusion	36	2½	3	" 9.	20¼	" 18,	24½	44¾	9½
Admiral	36	2½	3	" 9,	26½	" 18,	13	39½	10
Melting Sugar or Edible Podded	46	2¾	3¼	" 9,	14½	" 18,	36½	51	12
Champion of England	46	2½	3¾	" 9,	17	" 18,	15½	32½	6¼
Horsford's Markets	31	2¾	3	" 9,	12½	" 18,	25½	38	9¼
Startler	30	2¼	2¾	" 9,	16½	" 18,	21½	38	5¼
Duke of Albany	46	3¼	4¼	" 9,	12½	" 18,	23½	36	13
Sutton's Satisfaction	46	2½	3	" 9,	16¾	" 18,	36½	53¼	11¾
Pride of the Market	20	2¾	3½	" 9,	17	" 18,	31½	48½	12
Abundance	34	2½	2¾	" 9,	19½	" 18,	26¾	46¼	10¾
Everbearing	33	2½	3	" 9,	13½	18,	14¾	28¼	6½
Sutton's Dwarf Defiance	18	2¾	3½	" 9,	16	" 18,	14½	30½	6½
Hair's Dwarf Mammoth	22	3¼	4	" 9,	16¼	" 18,	17¾	34¼	10
Daisy	24	2¾	3½	" 13,	22½	" 23,	22	44½	9¼
Burpee's Profusion	32	2½	3	" 13,	16	" 23,	25¾	41¾	5½
Prince of Wales	35	2¾	3¼	" 13,	33½	" 23,	23	56½	4¾
Duke of York	46	2¾	3½	" 13,	30	" 23,	22	52	7¾
Heroine	30	3½	4	" 13,	14½	" 23,	24	38½	9¼
Black-eyed Marrowfat	45	2¾	3	" 13,	20½	" 23,	36½	57	12¾
McLean's Prolific	30	3¼	4	" 13,	24	" 23,	24¾	48¾	9
Dwarf Champion of England	30	2¼	2¾	" 13,	14	" 23,	24	38	8¼

Garden Pease—Test of Varieties.

Name of Variety.	Length of Vine.	Length of Pod.		Date when Pulled and Pounds of Marketable Pease with Pods, per Plot.				Total Yield of Marketable Pease, per Plot.	Yield of Ripened Seed per Plot.
	Inches.	Inches.			Lbs.		Lbs.	Lbs.	Lbs.
Eugenie	45	2½	3	Aug. 13,	23¾	Aug. 23,	29½	53¼	11
900 to 1	48	2¼	3	" 13,	23	" 23,	18½	41½	12
Juno	30	2½	3¼	" 13,	20	" 23,	35½	55½	8¼
Queen	44	3	4	" 13,	12¼	" 23,	16½	28¾	4½
Grant's Favourite	46	2½	2¾	" 13,	12½	" 23,	36½	49	12
Anticipation	35	2¾	3½	" 13,	22½	" 23,	30½	53	7¼
Forty-fold	48	2¾	3	" 13,	20	" 23,	36½	56½	13
King of the Dwarfs	22	2½	3	" 13,	24	" 23,	6¾	30¾	6¼
Telegraph	46	2¾	3½	" 13,	20¼	" 23,	16¼	36½	12
Pride	36	2¼	2¾	" 13,	16¼	" 23,	19¼	35½	10
Scheriezer's Giant	42	3	4	" 18,	12¼	" 25,	36	48¼	9
Sharp's Queen	46	2¾	3½	" 18,	12½	" 25,	35¾	48¼	4½
Shropshire Hero	33	2½	3¼	" 18,	23¼	" 25,	16½	39¾	7½
New Victory	36	3	3½	" 18,	4¼	" 25,	40	44¼	6¾
Scimitar	47	3	3¾	" 18,	5¾	" 25,	32½	38¼	9½
Veitch's Perfection	48	2¾	3½	" 18,	4½	" 25,	33¼	37¾	8¾
Sander's Marrow	46	3	3½	" 18,	3½	" 25,	34½	38	6¼
Early Britain	48	2¼	3½	" 18,	8½	" 25,	25½	34	7½

EXPERIMENTS WITH BEANS.

Twenty-seven varieties of beans were planted June 19, in rows 3 feet apart. Each plot was one row 66 feet long, and two plots of each sort were sown. One plot was pulled to obtain the weight of green marketable beans, and the other was left to ripen. The seed was planted on level ground in drills made 1½ inches deep and placed 2 inches apart.

The land was previously in vegetables, and having been manured for that crop, no fertilizer was applied for the beans. The land was ploughed in the fall and worked up the following spring with the disc and spring-tooth harrows, before seeding.

The different varieties were all more or less affected with the bean anthracnose or pod-spot, which greatly injured the crop. The varieties Keeney's Rustless Wax, and Extra Early Red Valentine, were most free from this disease.

BEANS—TEST OF VARIETIES.

Name of Variety.	Date when pulled for use and pounds of edible Beans per plot.				Length of Pod.	Colour of Pod.	Rusted.	Yield of seed per plot.		How Matured.
	Lbs.	Oz.	Lbs.	Oz.	Inches.			Lbs.	Oz.	
	Aug. 8.		Aug. 15.							
Flageolet Scarlet Wax..........	7	8	12	5	5 to 6	Yellow.	Badly........	4	8	Poor.
Dwarf German Black Wax......	16	2	14	9	4 " 5	" ..	Slightly......	8	4	Good.
Long Yellow Six Weeks........	15	5	12	14	5 " 6	Green...	Badly........	10	9	"
Early Giant Wax or Butter.......	12	10	23	10	5 " 6	Yellow.	Considerably..	6	14	"
Early Mohawk..................	10		11	4	4½ " 5¾	Green...	None.........	12		Fair.
Dun Colour.....................	13	9	7	13	4½ " 5½	" ..	Badly........	7	8	Good.
Early China....................	7		14	4	4½ " 5	" ..	"	9		Fair.
Mammoth Red German Wax......	12	2	14	3	5 " 6	Yellow.	Slightly......	5	13	"
Improved Rust-proof Golden Wax..	8	8	13	8	3½ " 4	" ..	Considerably..	5	14	"
Detroit Wax....................	8	2	12	2	4 " 5	" ..	" ..	9	9	"
Crystal White Wax..............	15	10	24	7	5 " 6	" ..	Slightly......	10	8	"
Wardwell's Kidney Wax..........	10	4	9	14	4 " 5	" ..	"	7	5	Good.
	Aug. 15.		Aug. 21.							
Royal Dwarf Kidney.............	23	8	13	13	4½ " 5½	Green...	Considerably..	8	9	Fair.
Taber's I X L..................	18		21	9	5 " 6	" ..	" ..	8		"
Extra Early Red Valentine......	14	2	14	5	4½ " 5	" ..	None.......	10	5	"
Dwarf Bush Stringless..........	8	9	15	8	5½ " 6½	" ..	Considerably..	9	2	Good.
Early Large Marrowfat..........	6	2	10	7	4½ " 5	" ..	" ..	5	13	Fair.
Dwarf Bush Golden Wax..........	12	2	20		3½ " 4½	Yellow.	Badly........	6	8	Poor.
Canadian Wonder................	8	8	17	8	5½ " 6½	Green...	Considerably..	7	4	"
Black-Eyed Wax.................	4	3	14	7	3½ " 4¾	Yellow.	Badly........	4	4	"
Keeney's Rustless Wax..........	8	8	23	9	3½ " 4¾	" ..	None.........	10	9	Fair.
	Aug. 21.		Aug. 31.							
Mammoth Wax....................	8	4	12	2	4 " 5	" ..	Badly........	3	13	Poor.
Yosemite Wax...................	3	2	13	9	4 " 5½	" ..	"	4	9	"
Speckled Wax...................	6	7	12		5 " 6	" ..	"	7	4	Fair.
Early Refugee or 1,000 to 1......	3	9	42	5	3 " 4	Green...	Slightly......	12	2	Poor.
Roger's Lima Wax...............	6	9	13	6	3½ " 4	Yellow.	Considerably..	4	6	"
Cylinder Ivory Podded Wax.......	5	7	11	7	3½ " 4½	" ..	Badly......	7	5	"
Giant Dwarf Wax Red seeded.....	15	2	21		5 " 6	" ..	Considerably..	9	2	Fair.

EXPERIMENTS WITH BEANS IN HILLS AND ROWS.

As stated in my last annual report, the practice of growing beans in hills is supposed by some to hasten the crop of marketable green beans. To obtain further information on this point, nine varieties were grown in hills 2 feet apart, 3 feet apart, and in rows. The yield, as given below of each plot, is from one row 66 feet long.

There was no apparent difference in the time when the beans in rows and hills were ready for market. The yields did not indicate that one system was better than the other, and the total yield of marketable green beans per plot only is given. The yield of ripened seed from a duplicate plot is also given. The land was cultivated and fertilized the same as the other bean plots. The soil was a heavy clay loam.

BEANS—TEST OF VARIETIES IN HILLS AND ROWS.

Name of Variety.	Hills 2 feet apart.				Hills 3 feet apart.				Rows			
	Yield of Edible Marketable Beans per plot.		Yield of Harvested Seed per plot.		Yield of Edible Marketable Beans per plot.		Yield of Harvested Seed per plot.		Yield of Edible Marketable Beans per plot.		Yield of Harvested Seed per plot.	
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Dwarf German Black Wax......	32	2	7	9	48	9	8	....	30	5	8	6
Early Six Weeks..............	37	13	8	9	37	13	10	8	28	11	9	2
Mammoth Red German Wax...	26	9	4	12	16	8	3	9	26	4	4	7
Rust-proof Golden Wax	20	5	6	6	24	....	6	5	22	6	5	9
Early Mohawk.......	26	....	5	5	20	8	7	....	20	4	6	6
Extra Early Red Valentine.....	35	2	6	13	35	13	7	9	28	9	7	....
Detroit Wax	14	12	7	8	12	10	9	...	16	....	8	8
Keeney's Rustless Wax.........	34	...	11	9	30	8	13	2	32	4	9	8
Early Large White Marrowfat..	12	9	6	2	20	....	8	9	16	8	9	4

EXPERIMENTS WITH TOMATOES.

Fifty-three varieties of tomatoes were grown, and each plot was made up of six plants, set 4 feet apart each way. On August 30 what fruit had ripened was picked and weighed. The fruit that ripened subsequently was picked and weighed early in September, and on the 15th of the month all the fruit was picked and weighed. The total yield of ripe and green fruit obtained is given in the appended table.

The soil of these plots had no manure the two previous years, and was manured with 25 one-horse cartloads of stable manure per acre in the spring of 1900, and ploughed under, after which the land was worked up and the plants set. One handful of nitrate of soda was scattered around each plant after they had got nicely started, which gave the plants a good vigorous growth.

The seed was sown in a hot-bed March 26. The plants wère thinned to one inch apart as soon as they were large enough, and removed to another hot-bed April 19, each plant being set in a strawberry fruit box full of good earth. These were placed in the hot-bed, where they remained until removed to the open ground, June 1. The plants when put out were from six to eight inches high. Very thrifty and stocky.

The hot-bed was well ventilated so that a thrifty growth was obtained. The earth in the boxes was thoroughly wet before the plants were put out, and the sides of each box were cut so that the earth and roots would not be disturbed. The plants treated in this way suffered no check whatever and made splendid growth and gave a good yield of ripened fruit.

TOMATOES—TEST OF VARIETIES.

Name of Variety.	Character of Fruit.	Size of Fruit	Yield of Ripe Fruit from 6 hills, Aug. 30.		Total Yield from Six Plants.					
					Ripe.		Green.		Total.	
			Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.
Earliest of all	Irregular	Small	5	..	32	2	15	4	47	6
Extra Early Jersey	″	Medium	2	..	55	9	68	..	123	9
Mitchell's No. 1	Medium, smooth	Large	1	15	20	12	48	9	69	5
Canada Victor	Irregular	″	1	15	29	9	56	3	85	12
Early Bird	Round, smooth	Medium	1	13	37	4	58	7	95	11
Creekside Glory	Medium, smooth	Large	1	13	24	1	54	2	78	3
Long Red Perfection	Smooth	″	1	12	15	15	76	15	92	14
Freedom	Round, smooth	Medium	1	11	32	11	40	2	72	13
Early Richmond	Irregular	Large	1	11	52	13	50	1	102	14
Lorillard	Round, smooth	″	1	9	12	2	32	7	44	9
Democrat	″	″	1	8	11	2	31	6	42	8
Royal Red	Smooth	″	1	6	16	9	48	..	64	9
Early Bermuda	Irregular	″	1	5	29	3	39	2	68	5
Livingston's Magnus	Smooth	Very large	1	2	19	8	46	13	66	5
Fordhook's First	″	Large	1	..	23	4	61	8	84	12
Conference	Round, smooth	Medium	..	15	17	9	40	2	57	11
Table Queen	Smooth	Large	..	14	22	5	61	2	83	7
Livingston's Beauty	″	Medium	..	13	20	..	44	15	64	15
Bond's Early Minnesota	Round, smooth	″	..	13	15	8	43	..	58	8
Atlantic Prize	Smooth	Large	..	12	32	..	49	4	81	4
Early Ruby	Medium, smooth	Medium	..	9	36	4	52	4	88	8
Waldorf	Round, smooth	Small	..	7	32	7	53	15	86	6
Volunteer	Smooth	Large	..	3	12	4	48	15	61	3
Thorburn's Long Keeper	″	″	..	3	28	2	64	..	92	2
Golden Queen	″	″	..	2	22	8	51	..	73	8
Mikado	Round, smooth	Medium	..	2	20	7	42	6	62	13
Dwarf Champion	″	″	..	2	11	7	28	14	40	5
Improved Trophy	″	Large	..	2	12	1	30	8	42	9
Potato Leaf	Smooth	″	..	2	14	2	38	5	52	7
Optimus	″	″	..	2	14	12	70	15	85	11
Ignotum	″	″	..	2	13	2	54	15	68	1
Money Maker	Medium, smooth	″	..	..	28	4	63	2	91	6
New Stone	Smooth	″	..	..	18	1	38	1	56	2
Autocrat	″	″	..	..	18	1	39	2	57	3
Early Conqueror	Medium, smooth	″	..	..	18	1	52	12	70	13
Maule's New Imperial	Smooth	″	..	..	17	2	68	15	86	1
Acme	″	″	..	..	17	2	64	.	81	2
Matchless	″	Very large	..	..	16	..	30	..	46	..
Enormous	″	Large	..	..	15	4	49	3	64	7
Crimson Cushion	Medium, smooth	″	..	..	15	2	46	9	61	11
Buckeye State	Smooth	″	..	..	12	6	38	15	51	5
Imperial	Medium, smooth	″	..	..	12	6	36	8	48	14
Ponderosa	Round, smooth	″	..	..	9	12	36	13	46	9
Baltimore Prize Taker	Smooth	Medium	..	..	9	..	53	15	62	15
Favourite	″	Large	..	..	9	..	33	..	42	..
Yellow Plum	″	Small	..	..	7	8	32	15	40	7
Red Peach	″	″	..	..	7	7	15	11	23	2
Pear Shaped Yellow	″	″	..	..	7	4	31	2	38	6
Potomac	Round, smooth	Medium	..	..	7	..	31	3	38	3
New Yellow Peach	Smooth	Small	..	..	7	..	24	2	31	2
Essex Hybrid	″	Medium	..	..	6	6	42	15	49	5
Comrade	Round, smooth	″	..	..	6	2	60	5	66	7
Honour Bright	Smooth	Large	..	..	4	..	45	2	49	2

EXPERIMENTS WITH CAULIFLOWERS.

Twelve varieties of cauliflower were started in the hot-bed, April 11, in rows, 4 inches apart. These were thinned to one inch apart in the rows, April 21. The plants were given good ventilation and grew thrifty and stocky. They were set in the open ground June 2 ; made very good growth and some splendid heads were obtained.

The land was a clay loam, which was in strawberries the previous season. These were ploughed under in the fall and the land worked up the following spring. No manure was used but complete fertilizer at the rate of 800 pounds per acre was sown broadcast and harrowed in as stated in the potato experiments. The rows were run 24 inches apart, raked off and the plants set.

Weights were obtained of the early plots as given in the table, but of the later sorts which headed after August 24 no weights were obtained.

CAULIFLOWERS—TEST OF VARIETIES.

Name of Variety.	Number of Plants Set.	Plants that Died or did not Mature Heads.	Matured Heads, when Cut, and Weights. July 19.		July 25.		Aug. 3.		Aug. 9.		Aug. 16.		Aug. 24.		Total Weight of Matured Heads.		How Headed and Character of Growth.
			Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	Hds.	Lbs.	
Early Snowball	18	7	5	2¼	1	¾	....	....	2	3¼	2	6½	1	3	11	15¾	Fine compact heads, not vigorous.
Gilt Edge	18	3	2	2	1	¾	2	2¾	4	6¼	3	8½	3	6½	15	26¾	" " " vigorous.
Thorburn's Denmark	18	1	3	2	5	3½	....	....	4	9¾	2	6	3	8½	17	29¾	Very fine large compact heads, vigorous.
Extra Early Dwarf Erfurt	18	4	6	2½	3	1¾	....	....	2	1½	3	8	....	....	14	13¾	Fine compact heads, fairly vigorous.
Large Early Dwarf Erfurt	18	6	2	1¼	3	2	....	....	3	6¾	3	8½	1	3½	12	22	Very fine large compact heads, vigorous.
Thorburn's Nonpareil	18	1	2	1	4	3½	2	2¾	3	6¼	3	8	3	5½	17	27	" " " " very vigorous.
Lenormand's Short Stem	18	....	....	....	5	3¾	8	6¼	4	5	1	1¼	....	....	18	16¼	Heads not compact, poor, vigorous.
Early London	18	1	....	....	....	....	....	....	3	6½	....	....	2	4½	5	11	Heads compact and good, vigorous.
Extra Early Paris	18	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Heads fair, vigorous.
Early Walcheren	18	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Heads poor, no value, vigorous.
Autumn Giant	18	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Heads compact, good, vigorous.
Large Late Algiers	18	6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	" " " "

EXPERIMENTS WITH GARDEN CORN.

Experiments were conducted with twelve varieties of garden corn, which were planted in hills 3 feet apart each way on May 30. The land was previously in beans and was manured in the spring of 1900 with 25 one-horse cart-loads of stable manure per acre, which was ploughed under and worked up. The plots made slow early growth. Each plot was one row 66 feet long. The yields of marketable ears are given in the following table. The crop was cut September 15.

This is the first year that the variety 'New Champion' has been grown here, and it appears from the test that it is a promising sort.

GARDEN CORN—TEST OF VARIETIES.

Name of Variety.	Number of Ears Fit for Market.	Size of Ears.	Condition for Use.
Early White Cory	163	Medium	Good
Crosby's Early	142	"	"
New Champion	122	Large	"
Perry's Hybrid	32	"	"
Nonesuch	30	"	"
Hickox Improved	28	"	"
Old Colony	23	Fair	"
Moore's Early Concord	12	Large	Fair
Kendall's Early Giant	8	"	"
Country Gentleman	....	....	Not fit
Stowell's Evergreen	....	....	"
Zig-zag Evergreen	....	....	"

SOAKING GARDEN CORN SEED TO HASTEN GROWTH.

To gain information as to the value of soaking corn before planting, an experiment was tried by soaking the seed of four varieties in warm water for twelve hours before planting. Duplicate plots were planted alongside which were not soaked. The seed was planted in hills 3 feet apart May 31.

There was no apparent difference in the growth of the plants from the seed soaked and not soaked, and judging from two years experiments along this line, it would appear that there is no gain whatever in soaking the seed. The crop was cut September 15. The following numbers of ears were obtained from the plots, each being one row, 66 feet long :—

GARDEN CORN—SOAKED AND NOT SOAKED.

Name of Variety.	Row Soaked. — Number of Ears.	Row Not Soaked. — Number of Ears.
Early White Cory	142	136
Crosby's Early	153	162
Perry's Hybrid	41	46
Nonesuch	25	23

BARN-YARD MANURE COMPARED WITH COMMERCIAL FERTILIZERS ON EARLY POTATOES.

Nine varieties of potatoes were selected as among the most promising early sorts, and the object of the experiment was to learn which ones would produce the most early marketable tubers ; also, to determine the value of stable manure compared with commercial fertilizers for producing an early crop.

Well rotted stable manure, at the rate of twenty-five one-horse cart-loads per acre, was spread on the land in the fall after it was ploughed. The previous crop was strawberries, the plants having been ploughed under. One end of the field, a strip 68 feet long, was manured, and the balance was fertilized with chemical potato fertilizer, at the rate of 800 pounds per acre.

The land was worked up in the spring by ploughing and the spring-tooth harrow, after which the fertilizer was sown and harrowed in by the smoothing harrow. The land was drilled into rows, 24 inches apart, and the seed planted one foot apart in the rows, and covered with the plough. The potatoes were cut so that each piece contained from two to three eyes.

The size of a plot was one row, 66 feet long. The yield of marketable and unmarketable potatoes on a part of the field which was fertilized only, and dug August 10 is given ; also, the yield from both manured and fertilized plots dug August 24 is given. The seed was planted May 30. The variety Irish Cobbler is a white potato, with rather deep eyes. Burpee's Extra Early, Bovee, Pearce's Extra Early, Early Six Weeks and Crown Jewel are pinkish-white sorts, the others are rose colour. These varieties are all of excellent quality :—

EXPERIMENTS WITH EARLY POTATOES, WITH BARN-YARD MANURE AND ARTIFICIAL FERTILIZER.

Name of Variety.	Fertilized. Dug Aug. 10.		Fertilized. Dug Aug. 24.		Manured. Dug Aug. 24.	
	Marketable.	Not Marketable.	Marketable.	Not Marketable.	Marketable.	Not Marketable.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Burpee's Extra Early	28½	4½	57	7½	64½	9
Irish Cobbler	40½	6	52½	9	66	10½
Bovee	36	12	39	10½	60	9¾
Pearce's Extra Early	27	4½	37½	6	42	4¼
Early Gem	33	8¼	52½	10½	70½	9
Early Six Weeks	33	6	39	6	61½	9
Early Sunrise	33	9	37½	7¼	57	7½
Early Ohio	30	9	45¾	6	56¼	6
Crown Jewel	42	8½	58½	4½	66	7½

EXPERIMENTS WITH BORDEAUX MIXTURE AS A PREVENTIVE OF ROT IN POTATOES.

A strip of land on which nine varieties were grown was thoroughly sprayed July 27, August 7, 17 and 27 ; a strip adjoining on which the same sorts were growing was left unsprayed.

The piece of land on which these potatoes were grown received the same treatment as far as cultivation and fertilizing, all having received only potato fertilizer. The

land was worked up as stated in the other potato tests. The soil was as even as it was possible to get it.

The plants sprayed remained green and were practically free from rot. Those not sprayed blighted badly.

In order to be effective with this mixture the work must be thoroughly done. The plants must be well covered, and this can only be done by having a good spraying outfit. If heavy rains wash the mixture off, they should be again sprayed, as only by keeping the plants coated with the solution will the blight spores be killed.

The rows were 24 inches apart, and the seed was dropped 1 foot apart in the rows, each piece having from two to three eyes. Ten feet of space was left between the treated and untreated plots. The seed was planted May 30, and the crop dug September 21. The plots were each one row, 66 feet long :—

EXPERIMENTS WITH BORDEAUX MIXTURE AS A PREVENTIVE OF ROT IN POTATOES.

Name of Variety.	Not Sprayed.			Sprayed.		
	Marketable.	Not Marketable.	Rotten.	Marketable.	Not Marketable.	Rotten.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Burpee's Extra Early	43½	12	30	52½	22½	3
Irish Cobbler	55½	13½	40½	54	15	
Bovee	28½	13½	31½	52½	16½	
Pearce's Extra Early	25½	12	31½	43½	10½	3
Early Gem	60	19½	22½	64½	10½	
Early Six Weeks	16½	7½	39	43½	6	
Early Sunrise	28½	13½	31½	52½	12	
Early Ohio	37½	4½	37½	43½	9	3
Crown Jewel	37½	7½	31½	54	7½	9

AGRICULTURAL MEETINGS.

I attended the annual meeting of the Nova Scotia Fruit Growers' Association, at Wolfville, N.S., on January 30 and 31. I also addressed agricultural meetings at the following places :—

January 15.—St. John, N.B.

February 20.—Upper Jemseg, N.B.

" 21.—Gagetown, N.B.

" 22.—Shannon, N.B.

" 23.—Jerusalem, N.B.

" 24.—Olinville, N.B.

" 26.—Welsford, N.B.

I have the honour to be, sir,

Your obedient servant,

W. S. BLAIR,

Horticulturist.

Brandon, Man. Part of herd on brome aftermath.

Avenue of Manitoba Maples leading to barn on Experimental Farm at Brandon, Man.

EXPERIMENTAL FARM FOR MANITOBA.

REPORT OF S. A. BEDFORD, SUPERINTENDENT.

BRANDON, MAN., November 30, 1900.

To DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my thirteenth annual report, with details of the experiments undertaken and work accomplished on the Brandon Experimental Farm during the past year.

Viewed from an agricultural standpoint, the past season has been one of the most disastrous in the history of the province.

The spring opened up about the average date, and seeding commenced on this farm April 5.

As very little snow fell during the winter, the soil even on summer-fallow was very loose for several inches below the surface, and by April 25 this loose soil commenced to drift with the wind, cutting off all young growth and forming in some instances ridges of soil on the boundaries of the fields several feet high.

Owing to the abundance of vegetable fiber in the soil of the grain fields on the experimental farm, there was very little injury from this cause, but in the fruit plantations where it was unadvisable to grow grass, the top soil was in some cases stripped to a depth of six inches and piled up around the borders three feet deep.

There was 18 degrees of frost on May 2, cutting back the early sown wheat. This was followed by 8 degrees of frost on June 8. The injury from this last frost was very serious, all tender vegetation being cut even with the ground and in some instances oats and garden vegetables were completely killed; nearly all the fruit blossoms were also ruined and the young plums were frozen to the pit.

The injurious effects of these frosts was greatly increased by the drought prevailing at the time ; for it is found that a heavy rain directly after a frost materially assists vegetation to recover from the shock.

There was an almost total absence of rain during the spring months, only 57 100th inches fell between April 1 and June 25. This greatly retarded all vegetation, and many small seeds such as roots lay dormant in the ground for over a month.

The first heavy rain fell on June 26, and after that date growth was rapid, but the rain came too late to save the cultivated hay crop, which proved almost a failure ; early sown wheat was also too far advanced to receive much benefit, but oats and barley were greatly benefited and promised a very fair yield.

As if to compensate for the severe drought of spring, very heavy and constant rains set in after the first week in August, greatly interfering with harvest operations, hail-storms were also very general in nearly all parts of the province. The experimental farm was visited by a severe hail-storm accompanied by heavy rain on August

17. Very little harvesting was done at the time, and the standing grain was badly threshed out, in some instances thirty or forty bushels of oats per acre were shed on the ground. Fortunately, the hail-storm only struck the northern part of the farm.

The remainder of August was very wet, rain falling more or less nearly every day, making it very difficult to work the binders, and causing much of the grain to sprout in the stook, this, with the bleaching from rain, injured the quality of all sorts of grain.

As the first severe autumn frost did not occur until September 17, there was no injury from this cause in the latter part of the season.

EXPERIMENTS WITH SPRING WHEAT.

As a result of the unfavourable conditions previously mentioned, the yield of wheat has been very disappointing, and from an experimental standpoint, the result has been even more unsatisfactory, for instance on the date of the hail-storm, a large number of the early varieties were ready to cut, and in fact should have been harvested two days previous, had the weather been favourable; when these varieties were struck by hail they shelled out badly, while the late tight-chaffed varieties, such as Goose wheat, were very little injured by hail.

Then again, uneven germination in the spring, and delay in harvesting caused by rain in August, was far more injurious to some varieties than to others, for this reason the returns from this year's uniform trial plots cannot be considered a fair test of the comparative productiveness of the different varieties ; the results, however, are given simply as a matter of information.

The importance of selecting the most suitable kind of stook for wheat was emphasized this year. While the large round compact stooks stood up well and protected the inner sheaves from bleaching ; such stooks were invariably badly sprouted. The most satisfactory form of stook on this farm was composed of ten sheaves, six of them being placed opposite each other, and the remaining four set outside of the six, so as to break the joints. This form of stook was firm and dried out quickly.

The land was summer-fallowed the previous year, the uniform trial plots were one-twentieth of an acre each, and the soil was a sandy loam. All the varieties, fifty in number, were sown on April 18.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs	
1	Goose	August	20	128	28	Weak	2	Bearded	4,010	31	30	60	Considerably
2	Beaudry	"	20	124	29	Stiff	2	"	2,840	29	20	60½	Slightly.
3	Dions	"	20	124	33	Fair	3	"	3,300	26	40	59	"
4	Rio Grande	"	21	125	32	Stiff	3	"	2,550	25	50	59½	"
5	Beauty	"	20	124	29	"	3	Beardless	2,420	24	40	58	"
6	Wellman's Fife	"	20	124	32	"	3	"	2,340	24	20	57½	"
7	Laurel	"	20	124	35	"	3	"	2,660	24	00	57	"
8	White Connell	"	22	126	30	"	3	"	2,670	23	50	58	None.
9	Monarch	"	20	124	30	"	3	"	2,480	23	40	58	Slightly.
10	Rideau	"	20	124	28	"	2½	"	2,410	23	10	56	"
11	Roumanian	"	21	125	33	Fair	2	Bearded	2,720	23	..	60	"
12	Bluestem	"	20	124	36	Stiff	3¼	Beardless	2,820	23	..	56	None.
13	White Russian	"	20	124	30	"	3	"	2,725	22	55	57	Slightly.
14	White Fife	"	20	124	30	"	3	"	2,350	22	30	57	"
15	Red Fern	"	20	124	28	"	2	Bearded	2,280	22	..	58	"
16	Pringle's Champlain	"	20	124	25	Fair	2½	"	2,310	21	30	57	Considerably
17	Red Fife	"	21	125	30	Stiff	2¾	Beardless	2,530	21	20	57	Slightly.
18	Clyde	"	19	123	34	Fair	3	"	2,540	21	..	58	"
19	Red Swedish	"	19	123	36	"	3	Bearded	2,344	21	..	59	"
20	Percy	"	19	123	29	Stiff	2½	Beardless	2,340	21	..	57	"
21	Alpha	"	20	124	26	"	2¼	"	2,740	21	.	58	"
22	Countess	"	19	123	29	"	3	"	2,350	20	50	58	"
23	Dufferin	"	18	122	31	"	3	Bearded	2,150	20	50	58	"
24	Weldon	"	20	124	32	Fair	2½	Beardless	2,766	20	40	58½	"
25	Campbell's White Chaff	"	20	124	27	Stiff	2½	"	2,180	20	20	58	"
26	Stanley	"	18	122	32	"	2½	"	2,090	20	10	57½	"
27	Admiral	"	20	124	30	"	3	"	2,920	19	40	57	None.
28	Captor	"	20	124	31	"	2½	"	2,420	19	40	58	Slightly.
29	Progress	"	18	122	28	"	2½	"	2,130	19	30	58	"
30	Herisson Bearded	"	19	123	28	Fair	1½	Bearded	2,700	18	20	58	Badly.
31	Hungarian	"	18	122	25	Stiff	2	"	1,670	17	10	58	Considerably
32	Preston	"	18	122	32	"	2½	"	1,980	17	..	58	"
33	Crown	"	18	122	28	"	2½	"	1,690	16	50	57	Slightly.
34	Blenheim	"	21	125	34	"	3	"	2,595	16	45	55	"
35	Vernon	"	19	123	28	Fair	2¼	"	2,320	16	20	58	Badly.
36	Huron	"	18	122	30	Stiff	2	"	2,660	15	40	58	Slightly.
37	Advance	"	19	123	31	"	2½	"	2,500	15	..	57	"
38	Crawford	"	17	121	25	Fair	2¼	Beardless	2,100	15	..	57	Considerably
39	Mason	"	18	122	26	Stiff	2¼	"	1,910	14	50	57½	"
40	Blair	"	18	122	26	"	3	"	2,010	14	50	57	Slightly.
41	Ebert	"	17	121	26	Weak	2½	"	2,020	14	40	58	"
42	Colorado	"	18	122	29	Stiff	2½	Bearded	1,760	14	..	55	"
43	Dawn	"	18	122	22	"	2½	Beardless	1,470	13	50	58	Badly.
44	Byron	"	17	121	26	"	2½	Bearded	1,480	13	40	58	Slightly.
45	Norval	"	16	120	28	Fair	2½	"	2,100	13	20	57	Considerably
46	Early Riga	"	15	119	25	V. weak	2	Beardless	1,220	11	20	56½	Badly.
47	Fraser	"	16	120	26	Stiff	2½	Bearded	1,930	11	10	58	Considerably
48	Ladoga	"	18	122	30	Fair	2¼	"	2,270	10	30	56	"
49	Plumper	"	16	120	26	Stiff	2½	"	1,480	10	20	57½	"
50	Harold	"	18	122	26	Weak	2	"	1,600	8	20	57	Badly.

FIELD PLOTS OF SPRING WHEAT.

All sown on summer-fallow, soil, clay loam.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Yield per Acre.	
	Acres.				Inches.	Bush.	Lbs.
Preston	5	April 10	Aug. 8	120	36	26	24
Advance	1	" 10	" 10	122	36	17	33
White Connell	2	" 12	" 15	125	31	30	
Ladoga	1	" 12	" 14	124	31	20	30
Monarch	1	" 6	" 12	128	31	42	30
White Fife	$2\frac{3}{4}$	" 6	" 14	130	33	40	21
Red Fife	3	" 6	" 15	131	31	45	50
Stanley	3	" 6	" 10	126	36	34	40
Percy	3	" 6	" 11	127	36	38	40

SELECTED AND UNSELECTED SEEDS.

During the harvest season of 1899 the largest heads were selected from the standing grain of some of the uniform tests plots of wheat and barley; these heads were threshed out and the grain sown for a comparison with unselected grain from the same plot.

The accompanying tables give the result. Owing to unexpected loss in cleaning only one-fortieth acre plots of the selected wheat were sown. The barley plots were all one-twentieth acre each. The soil was a sandy loam, summer-fallowed. The plots of wheat were sown on April 18 and 19, and those of the barley on May 17 and 18.

SPRING WHEAT.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			Inches.		Inches.		Lbs.	Bush.	Lbs.	Lbs.
White Fife, selected	Aug. 22	125	30	Stiff	3	Beardless	2,300	25		56
" " unselected	" 20	124	30	"	3	"	2,350	22	30	57
Wellman's Fife, selected	" 22	125	31	"	3	"	1,240	22	40	57
" " unselected	" 20	124	32	"	3	"	2,340	24	20	$57\frac{1}{2}$
Red Fife, selected	" 22	125	31	"	$2\frac{1}{2}$	"	2,060	19		57
" unselected	" 21	125	30	"	$2\frac{3}{4}$	"	2,530	21	20	57
Preston, selected	" 19	122	31	Fair	$2\frac{1}{2}$	Bearded	2,280	18	40	55
" unselected	" 18	122	32	Stiff	$2\frac{1}{2}$	"	1,980	17		58
Admiral, selected	" 19	122	29	"	3	Beardless	2,080	15	20	$53\frac{1}{2}$
" unselected	" 20	124	30	"	3	"	2,920	19	40	57

BARLEY.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
	May	Aug.		Inches.		Inch's		Lbs.	Bush.	Lbs.	Lbs.
Odessa, selected...........	17	24	99	34	Fair..	2	6 rowed	1,810	41	22	46
" unselected........	17	24	99	28	" .	2½	6 "	2,210	42	34	47
Common, selected..........	17	22	97	37	" .	3	6 "	1,500	33	16	45
" unselected.......	17	22	97	36	" .	3	6 "	1,670	29	38	45½
		Sept.									
Canadian Thorpe, selected..	18	8	112	32	Stiff..	3	2 "	3,490	27	14	46
" " unselected	18	8	112	33	" .	3½	2 "	2,950	34	18	47½

DIFFERENT METHODS OF PREPARING LAND FOR SPRING WHEAT.

As is usual on the experimental farm much better returns of wheat was obtained after a leguminous crop than when following either wheat or oats.

The size of the plots in this experiment was one-twentieth acre, the soil a clay loam, and the date of sowing was April 24.

Name of Variety.	Previous Crop.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
		Aug.		Inch's		Inch's		Lbs.	Bush.	Lbs.	Lbs
Wheat, Red Fife...	Summer fallow......	21	119	28	Stiff..	3	Beardless.	3,290	21	50	58
" " ..	Soja Beans	21	119	23	" .	2	" .	2,640	17	40	58
" " ..	Horse Beans........	21	119	29	" .	3	" .	2,490	16	50	58
" " ..	Pease...............	21	119	27	" .	2	" .	2,690	16	50	56
" " ..	Stubble, not plowed.	21	119	28	" .	2	" .	1,730	11	10	58
" " ..	Wheat..............	21	119	28	" .	3	" .	1,180	10	20	58
" " ..	Oats....	21	119	22	"	2	" .	1,380	8	40	55

EXPERIMENT WITH SPELTZ WHEAT.

This variety of spring wheat is attracting some attention in western Canada at present. It differs from the ordinary wheat of commerce in that its chaff is adherent and cannot be separated from the kernel by the ordinary threshing machine. It is said that machines are in use in Europe, capable of separating the chaff from the kernel, but in this country both are ground together and the product used for cattle and pig fed.

The straw is finer than that from other wheat but its feeding value has not been tested on the experimental farm.

The sample grown on the farm weighed about 40 pounds to the measured bushel, but as the Speltz wheat was grown side by side with Red Fife for comparison the bushel has been estimated in both cases at 60 pounds.

The size of the plot for this test was one-twentieth acre, the soil a sandy loam, summer-fallowed. The Red Fife wheat was sown on April 28, and the Speltz on April 26.

Name of Variety.	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	
			Inches.		Inches.		Lbs.	Bush.	Lbs.
Red Fife	Aug. 21	115	36	Stiff	3	Beardless.	3,820	23	
Speltz	" 21	117	27	Fair	2	"	3,360	45	40

The actual weight of Speltz per acre was 2,740 pounds.
The actual weight of Red Fife per acre was 1,380 pounds.

TEST OF SMUT PREVENTIVES FOR WHEAT.

Very satisfactory results have been obtained with bluestone (Copper sulphate) for this purpose, but this article has increased in value considerably during the past year and in some parts of the province has been difficult to obtain. This season a test has been made with Formalin, and, as will be seen from the accompanying table, the results have been very satisfactory. Massel Powder has also given good results.

The wheat used for seed was a very smutty sample.

Name of Variety.	How Treated.	Good Heads.	Smut Heads.
		In 9 sq. ft.	In 9 sq. ft.
Red Fife Wheat	Not treated	452	59
"	Steeped 5 minutes 4½ ounces Formalin to 10 gals. water	550	0
"	" 15 " " " " " "	529	0
"	" 1 hour " " " " " "	531	0
"	Sprinkled 4½ ounces Formalin to 10 gals. water	528	0
"	" 9 " " " " "	474	0
"	" 1 pound bluestone to 1 pail water to 8 bushels of wheat.	481	0
"	Steeped 1 pound bluestone to 3 pails water	433	2
"	Treated with Massel Powder	504	0

A TEST OF FERTILIZERS FOR THE GROWING OF WHEAT.

Seven plots were set part for this test, but the results have been somewhat unsatisfactory, attributable no doubt to the unfavourable season ; as no rain fell for some time after the fertilizers were applied they were in all probability blown off the land before the plants had time to assimilate them.

No 1 was an outside plot somewhat exposed to injury from drifting soil, hence the small returns from it.

The size of the plots was one-fortieth acre, the soil a rich clay loam which had been summer-fallowed; all were sown on April 21, and all harvested on August 21.

The variety of wheat sown on all the plots was Red Fife, 1½ bushels of seed per acre.

	Red Fife Wheat. Fertilizers Applied.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre	Yield per Acre of Wheat.		Weight per Bushel.
		In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	100 lbs. per acre of Nitrate of Soda, one-half sprinkled when grain was 2 inches high; balance when 6 inches high	31	Stiff..	2	Beardless.	1,530	15	40	59
2	200 lbs. per acre of Nitrate of Soda, one-half sprinkled when grain was 2 inches high, balance when 6 inches high	29	"	3	"	1,590	30	20	58
3	No fertilizer used	29	"	3	"	1,860	31	20	59
4	Superphosphate, 400 lbs. per acre spread just before sowing	33	"	3½	"	2,000	26	40	60
5	Muriate of potash, 200 lbs. per acre spread just before sowing	32	"	3	"	1,530	29	00	60
6	A mixture, 200 pounds superphosphate, 100 pounds nitrate of soda, 100 pounds muriate potash per acre, half to be spread before sowing, half when 2 or 3 inches high	29	"	2¾	"	1,900	30	00	59
7	No fertilizer used	30	"	3	"	2,240	28	40	58½

ROTATION OF CROPS.

Last year, in accordance with your instructions, arrangements were made for a series of rotation plots, the principal object in view being the maintenance of the fertility of the soil, by ploughing under a leguminous crop every third year ; instead of the usual summer-fallow.

The Soja beans were sown in rows 14 inches apart, using 60 pounds of seed per acre. The Red Clover was sown in the proportion of 12 pounds per acre, and the mixed clovers in the proportion of 8 pounds of Alfalfa and 6 pounds of Alsike per acre. These leguminous plants were to be ploughed under when they reached their fullest development. The order of rotation is as follows :—

PLAN OF ROTATION.

No.	1899.	1900.	1901.
1	Wheat	Oats	Soja Beans.
2	Wheat	Wheat	Pease.
3	Wheat	Oats	Tares.
4	Wheat	Wheat	Red Clover.
5	Wheat	Barley	Alfalfa and Alsike.
6	Pease	Wheat	Wheat.
7	Tares	Wheat	Oats.
8	Soja Beans	Wheat	Oats.
9	Red Clover	Wheat	Wheat.
10	Alfalfa and Alsike	Wheat	Barley.
11	Rape	Wheat	Summer fallow.
12	Wheat	Wheat	Summer fallow.
13	Wheat	Oats	Summer fallow.
14	Wheat	Barley	Summer fallow.
15	Wheat	Wheat	Oats.
16	Wheat	Barley	Oats.
17	Oats	Soja Beans	Wheat.
18	Wheat	Pease	Wheat.
19	Oats	Tares	Wheat.
20	Wheat	Red Clover	Wheat.
21	Barley	Alfalfa and Alsike	Wheat.
22	Rye	Summer fallow	Wheat.

RESULTS OF FIRST YEAR (1899) ON ROTATION PLOTS.

No.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days maturing.	Length of Straw.	Yield per Acre.		Weight per bushel.
					In.	Bush.	Lbs.	Lbs.
1	Wheat—Red Fife	May 15	Aug. 31	108	36	27	44	61
2	Wheat "	" 15	" 31	108	36	29	08	61
3	Wheat "	" 15	" 31	108	36	27	02	61
4	Wheat "	" 15	" 31	108	33	21	..	61
5	Wheat "	" 15	" 31	108	33	26	54	61
6	*Pease—Golden Vine	" 17						
7	*Tares	" 17						
8	*Soja Beans	" 17						
9	†Clover—Red	" 17						
10	†Clover—Alfalfa and Alsike	" 17						
11	‡Rape	" 17						
12	Wheat—Red Fife	" 15	Sept. 1	109	36	28	08	61
13	Wheat "	" 15	" 1	109	36	29	16	61
14	Wheat "	" 15	" 1	109	35	24	02	61
15	Wheat "	" 15	" 1	109	36	26	32	61
16	Wheat "	" 15	" 1	109	36	27	12	61
17	Oats—Bavarian	" 17	Aug. 31	106	31	27	44	37½
18	Wheat—Red Fife	May 15	Sept. 1	109	34	27	20	61
19	Oats—Bavarian	" 17	" 1	107	31	26	46	37½
20	Wheat—Red Fife	" 15	" 1	109	36	27	30	61
21	Barley—Odessa	" 17	" 1	107	36	38	38	49
22	‡Rye	17						

RESULTS of Second Year (1900) on Rotation Plots.

No.	Name of Variety.	Previous Crop.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Yield per Acre.		Weight per Bushel.
						In.	Bush.	lbs.	Lbs.
1	Oats—Banner	Wheat	May 9	Aug. 21	104	33	18	32	35
2	Wheat—Red Fife	Wheat	April 18	" 21	125	27	8	26	56
3	Oats—Banner	Wheat	May 9	" 21	104	30	26	22	34
4	Wheat—Red Fife	Wheat	April 18	" 24	128	27	6	12	56
5	Barley—Odessa	Wheat	May 16	" 25	101	31	12	44	43½
6	Wheat—Red Fife	Pease	April 18	" 21	125	29	23	42	58
7	Wheat "	Tares	" 18	" 21	125	30	25	04	58
8	Wheat "	Soja Beans	" 18	" 21	125	28	27	42	58
9	Wheat "	Clover	" 18	" 21	125	27	15	14	57
10	Wheat "	Clover	" 18	" 21	125	22	11	42	57½
11	Wheat "	Rape	" 18	" 21	125	36	24	40	58½
12	Wheat "	Wheat	" 18	" 23	127	24	7	34	57
13	Oats—Banner	Wheat	May 9	" 22	105	29	33	12	34
14	Barley—Odessa	Wheat	" 16	" 22	98	24	15	32	44½
15	Wheat—Red Fife	Wheat	April 18	" 23	127	24	6	48	57½
16	Barley—Odessa	Wheat	May 16	" 23	99	22	16	44	44
17	Soja Beans	Oats	April 28						
18	Pease—Golden Vine	Wheat	" 28						
19	**Tares	Oats	" 28						
20	**Clover—Red	Wheat	" 28						
21	Clover—Alfalfa and Alsike	Barley	" 28						
22	Wheat—Red Fife	Rye	" 18	Aug. 21	125	36	19	26	57½

* Ploughed under July 29. † Ploughed under July 4. ‡ Did not germinate, treated as summer fallow

** Ploughed under August 2.

ROTATION PLOTS.

This is the sixth year of this series of experiments, all the plots have retained the same position as last year ; the small returns from plots continuously in grain is very noticeable this year.

The size of the plots in this test was one-tenth of an acre, the soil an average sandy loam :—

No. of Plot.	1895. Crop.	1895. Value	1896. Crop.	1896. Value	1897. Crop.	1897. Value	1898. Crop.	1898. Value	1899. Crop.	1899. Value	1900. Crop.	1900. Yield.	1900. Value	Total Value.
		$ c.		$ c.		$ c.		$ c.		$ c.		Tons. Lbs.	$ c.	$ c.
1	Wheat .	22 50	Turnips	22 65	Wheat..	11 75	Corn. . .	44 00	Wheat .	15 83	Corn....	4 ..	16 00	132 73
2	Wheat .	11 25	Oats....	20 95	Wheat .	6 58	Oats . . .	15 14	Wheat .	13 50	Oats....	20 ..	6 00	73 42
3	Wheat .	8 25	Wheat .	16 83	Wheat .	11 33	Wheat .	13 91	Wheat .	9 58	Wheat..	5 20	3 20	63 10
4	Barley..	9 63	Wheat .	14 25	Oats....	8 75	Barley .	10 10	Wheat .	12 42	Oats....	15 20	4 67	59 82
5	Wheat .	22 91	Fallow .	.....	Wheat..	13 91	Fallow..	.....	Wheat .	17 50	Fallow .	.....	.....	54 32
6	Fallow .	.....	Wheat .	18 33	Oats....	9 41	Fallow..	.....	Wheat .	16 75	Oats....	31 6	9 35	53 84
7	Fallow..	.....	Wheat .	17 08	Barley..	5 52	Oats . . .	16 17	Fallow .	.....	Wheat..	14 35	8 75	47 52
8	Fallow..	.....	Wheat .	14 41	Oats....	9 04	Oats....	14 19	Fallow..	.....	Oats....	32 22	9 79	47 43

In estimating the value of the crops the following figures have been adopted throughout : Wheat has been taken at 50 cents per bushel ; barley at 25 cents ; oats at 25 cents and turnips at 5 cents per bushel. The value of corn cut green for ensilage has been taken at $2 per ton.

DEEP, MEDIUM AND SHALLOW SOWING.

The result of this test this year would appear to favour medium sowing as the highest average was obtained from 2-inch sowing.

The size of the plots used for this test was one-twentieth of an acre, and the soil was a sandy loam, summer-fallowed. The sowing was done with a drill :—

Name of Variety.	Depth Sown.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
					In.		In.		Lbs.	Bush.	lbs.	Lbs
Wheat—Red Fife	1 inch deep.	April 28	Aug. 21	115	36	Stiff..	3½	Beardless.	3,330	22	50	57
" " ..	2 " .	" 28	" 21	115	36	Fair..	3	" .	3,820	23	..	58
" " ..	3 " .	" 28	" 21	115	36	"	3	" .	3,540	19	20	55
Oats—Banner....	1 " .	May 11	" 28	109	38	Stiff..	8	Branching	2,750	27	32	28
" "	2 " .	" 11	" 28	109	38	" .	8	" .	2,350	27	32	29
" "	3 " .	" 11	" 28	109	38	" .	8	" .	3,350	25	..	28½
Barley—Mensury.	1 " .	" 11	" 21	102	36	" .	4	6-rowed...	2,510	24	38	41
" " ..	2 " .	" 11	" 21	102	36	" .	4	" ..	3,060	25	40	41
" " ..	3 " .	" 11	" 21	102	36	" "	4	" ..	2,840	20	..	41

EXPERIMENTS WITH OATS.

While this grain suffered less than wheat from poor germination in spring, the loss from hail was much greater. On the morning of August 18, the ground on the riper fields was practically covered with shelled grain. As an evidence of this, Flying Scotchman, generally not a very productive variety, was cut before the hail storm and gave a return of over 65 bushels per acre, while Improved Ligowo, usually a much more productive kind, but cut after the hail storm, only yielded 20 bushels and 30 pounds per acre. For this reason the returns given from the uniform trial plots of oats cannot be considered a fair test of the comparative productiveness of the varieties.

Owing to the prevalence of rust, and to the fact that the plumpest kernels were shelled out by hail, nearly all the varieties are light in weight.

Oat sheaves, only wet on the surface, were stacked with safety, but when wet to the heart, it was found necessary to thoroughly dry them before stacking. The patience of many farmers was severely tried this year, owing to the continued wet weather, and many stacked oats too soon ; with the result that at threshing time they were more or less heated, resulting in serious loss.

Sixty-one varieties were under test during 1900, but two of them, viz.: Columbus and New Electric, were completely destroyed by hail and were not harvested. The size of the plots was one-twentieth of an acre each, the soil was a clay loam summer-fallowed. All the plots were sown on May 3 and 4 :—

Oats—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs	
1	Black Beauty	Aug. 15.	104	36	V. weak	10	Branching	2,080	71	16	33	Slightly.
2	Rosedale	" 15.	104	39	Stiff ...	10	Half sided	4,130	66	26	34½	"
3	Flying Scotchman...	" 15.	103	41	" ...	9	Branching	3,760	65	30	34	"
4	Brandon	" 15.	104	40	Fair	9	Half sided	2,190	65	10	34	"
5	Hazlett's Seizure....	" 15.	104	40	"	12	Branching	4,230	60	30	35½	"
6	Master	" 15.	104	44	Stiff ...	9	Half sided	1,950	58	28	33	"
7	Miller	" 15.	104	36	" ...	9	Branching	4,290	56	6	33	None.
8	Oxford	" 16.	104	35	Fair	8	Half sided	1,935	56	..	34	Slightly.
9	Black Mesdag.......	" 15.	104	35	V. weak	9	Branching	2,665	54	34	28	None.
10	Cream Egyptian. ...	" 14.	102	36	Stiff ...	8	Half sided	3,330	52	2	37½	Considerably.
11	Holland............	" 18.	106	37	Fair	9	Sided.....	2,870	39	4	30	Slightly.
12	Joanette............	" 17.	105	40	Weak ..	9	Branching	3,770	33	8	30	"
13	Buckbee's Illinois....	" 17.	105	39	Fair	8	"	2,290	32	22	32½	"
14	Banner..	" 18.	107	36	Stiff ...	7	"	2,920	28	28	34½	"
15	Early Golden Prolific.	" 16.	105	37	Fair	6	"	2,160	27	22	33	"
16	Early Archangel.....	" 18.	106	50	"	10	"	2,570	27	12	35	None.
17	Wide Awake........	" 17.	105	42	"	8	"	2,480	27	2	35	Slightly.
18	Siberian O. A. C.....	" 17.	105	39	"	9	"	2,480	27	2	34	"
19	New Zealand.	" 16.	105	32	"	8	"	3,180	27	2	35	"
20	Improved American.	" 16.	105	34	Stiff ...	9	"	2,800	26	16	34	"
21	Danish Island......	" 16.	105	39	" ...	8	"	2,600	26	16	33	"
22	Golden Giant	" 16.	104	36	Fair	7	Sided.....	2,710	26	6	30	"
23	Salzer's Big 4.. . ..	" 17.	105	34	Weak ..	7	Branching	3,610	26	6	28½	"
24	Early Maine	" 16.	105	38	Fair	8	"	2,510	26	.	31	"
25	Oderbruch	" 17.	105	41	"	9	Half sided	2,920	25	30	33	"
26	Thousand Dollar.....	" 17.	105	37	" ...	7	Branching	2,930	25	20	34½	"
27	California Prolific Blk (Imp.)............	" 18.	107	41	"	11	Sided....	3,820	25	20	28	"
28	American Triumph..	" 16.	105	34	"	8	Branching	2,440	25	10	32	"
29	Bavarian	" 17.	105	40	"	9	"	2,950	25	..	32½	"
30	Abundance..........	" 18.	107	35	"	5	"	1,970	24	14	33	"
31	King...............	" 17.	105	34	"	8	"	2,370	24	14	32½	"
32	Kendal	" 17.	105	35	" ...	8	Sided.....	3,190	23	28	28	"
33	California Prolific Blk	" 18.	107	36	"	9	" ...	3,700	23	28	29	"
34	Prolific Blk Tartarian	" 16.	105	32	"	8	"	3,700	23	18	28	"
35	Abyssinia...........	" 17.	105	35	" ...	8	Half sided	1,910	23	8	34	"
36	Black Tartarian(Imp)	" 18	107	36	"	8	Sided.....	3,820	22	32	27	"
37	Wallis..............	" 16.	105	38	Stiff ...	7	Branching	2,730	22	22	33	None.
38	White Giant	" 16.	105	35	" ...	8	"	2,640	22	12	34	Slightly.
39	Mennonite..........	" 17.	105	35	Fair	9	"	2,640	22	12	33	"
40	Early Gothland	" 17.	105	33	"	8	Half sided	2,250	22	2	34	"
41	Newmarket	" 18.	106	39	"	8	Branching	2,250	22	2	34	"
42	Improved Ligowo....	" 16.	105	37	"	8	"	2,090	20	30	35	"
43	Salines	" 17.	105	42	"	10	"	2,100	20	20	30	"
44	Holstein Prolific.....	" 17.	105	38	"	8	"	2,300	20	20	34	"
45	Golden Beauty.....	" 17.	105	40	"	9	"	2,070	20	10	33	"
46	Sensation....	" 17.	105	33	"	6	"	2,540	19	14	33½	"
47	Golden Tartarian....	" 19.	107	49	" ...	9	Sided.....	2,840	19	14	30	Considerably.
48	Improv'd Ligowo(I'p)	" 18.	106	32	"	11	Branching	1,950	19	4	31	Slightlly.
49	Pense	" 18.	107	39	" ...	9	Half sided	3,470	18	18	28	"
50	Lincoln	" 19.	107	48	"	7	Branching	3,180	18	8	33	"
51	White Russian.......	" 18.	107	32	"	7	"	2,180	18	8	33	"
52	Olive.....	" 16.	105	38	"	9	Half sided	3,190	17	32	30	"
53	White Schonen......	" 16.	105	34	" .. .	9	Branching	2,220	17	2	33	"
54	Milford	" 17.	105	42	"	9	Half sided	2,530	16	26	28½	"
55	American Beauty....	" 16.	104	38	Stiff ...	8	Branching	3,380	15	10	35	"
56	Russell..............	" 18.	106	36	Fair	11	Half bran.	1,550	13	8	32½	"
57	Cromwell	" 17.	105	34	"	8	Branching	2,190	12	2	33½	Considerably.
58	Early Blossom.......	" 18.	106	35	"	9	Half sided	1,890	9	4	33	Slightly.
59	Bonanza	" 15.	103	42	Stiff....	9	Branching	2,090	9	4	36½	"

NOTE—The first ten varieties on the list were cut before the hail storm ; the others were cut after the storm.

FIELD PLOTS OF OATS.

The first three varieties were sown on backsetting, the remainder on summer-fallow. The soil was a clay loam :—

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield per Acre.	
					Bush.	Lbs.
Bavarian	3 acres	May 3	Aug. 21	110	44	18
Golden Giant	5 "	" 5	" 24	111	53	15
American Beauty	5 "	" 5	" 21	108	40	2
Abundance	3¾ "	" 8	" 24	108	32	4
Early Golden Prolific	2½ "	" 8	" 24	108	51	6
Joanette	1 "	" 9	" 26	109	22	9
California Prolific Black	1 "	" 9	" 26	109	36	1

TEST OF SMUT PREVENTIVES FOR OATS.

The seed for this test was a very smutty sample, as is evident from the resultant 51 per cent of smut from the untreated seed.

Formalin has again proven itself a very useful preparation for this purpose and its general use, each year, would save thousands of dollars to the province.

Massel powder does not appear to be of much value as a preventive of smut in oats.

Name of Variety.	How Treated.	Good Heads on Nine Sq. Ft.	Smut Heads on Nine Sq. Ft.
Doncaster Prize	Not treated	128	66
"	Steeped 5 minutes, 4½ oz. formalin to 10 galls. water	233	3
"	" 15 " 4½ " 10 "	188	5
"	" 1 hour 4½ " 10 "	211	0
"	Sprinkled, 4½ oz. formalin to 10 galls. water	195	5
"	" 9 " 10 "	262	0
"	Treated with Massel powder	186	108

EXPERIMENTS WITH BARLEY.

This grain, owing to its having been sown later than either wheat or oats, did not suffer so much from drought or hail, the principal loss was from drifting soil, the tender foliage of barley making it particularly susceptible to injury from this cause.

The size of the plots used for this test was one-twentieth of an acre, the soil was a sandy loam, summer-fallowed, and the plots were all sown on May 17 and 18. Forty-nine varieties were included in this test, nineteen of the two-rowed barley and thirty of the six-rowed.

Barley—Two Rowed—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				Ins.		Ins.	Lbs.	Bush.	Lbs.	Lbs.	
1	Canadian Thorpe	Sept. 8..	112	33	Stiff..	3½	2,950	34	18	47½	Slightly.
2	French Chevalier	" 12..	116	36	" ..	4	3,210	28	46	46	Considerably.
3	Danish Chevalier	" 12..	116	32	Weak	4½	3,030	28	26	46	"
4	Victor	" 4..	108	34	Fair..	4	2,270	27	34	48½	Slightly.
5	Nepean	" 8..	112	33	Stiff..	3½	2,120	26	32	48½	"
6	Kinver Chevalier	" 12..	116	36	Fair..	4	1,930	24	18	46	Considerably.
7	Sidney	" 1..	105	32	Stiff..	4½	1,850	23	46	47	Slightly.
8	Beaver	" 12..	116	24	" .	3½	2,050	23	46	48	"
9	Prize Prolific	" 12..	116	31	" .	4	2,260	23	36	46	"
10	Newton	" 8..	112	31	" .	4	2,505	22	39	48	"
11	Jarvis	" 2..	106	39	Fair..	4½	2,615	22	29	46	"
12	Gordon	" 1..	105	36	Stiff..	2½	2,260	21	32	44	"
13	Bolton	" 1..	105	36	Fair..	3	1,990	21	2	47	"
14	Leslie	" 4..	108	36	Stiff..	4	1,640	20	..	47	"
15	Logan	" 1..	105	36	Fair..	4	3,050	19	38	47½	"
16	Clifford	" 1..	105	34	Stiff..	3½	2,180	19	8	46	"
17	Dunham	" 1..	105	33	" .	3	1,910	17	44	45	"
18	Harvey	" 5..	109	36	" .	4	2,180	17	2	46	Considerably.
19	Fulton	" 3..	107	33	" .	3	1,990	16	42	46½	Slightly.

Barley—Six Rowed—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.		
1	Odessa	Aug. 24..	99	28	Fair.....	2½	4,900	42	34	47	Slightly.
2	Mensury	" 21..	96	40	Stiff......	3	2,240	40	40	44	"
3	Pioneer	" 26..	101	38	Fair......	3	2,960	40	20	49	"
4	Oderbruch	" 22..	97	29	"	2½	1,760	40	20	48	"
5	Nugent	" 26..	101	29	Stiff......	2½	2,115	37	9	46	Considerably.
6	Yale	" 24..	99	31	Fair......	2½	2,460	36	12	46	Slightly.
7	Claude	" 26..	101	32	Stiff......	3½	1,660	36	12	43	Considerably.
8	Mansfield	" 23..	98	35	Fair......	3	2,190	35	30	44	Slightly.
9	Stella	" 27..	102	32	Stiff......	2½	2,270	33	46	47	Considerably.
10	Empire	" 25..	100	34	"	2	2,100	33	16	48	Slightly.
11	Blue Long Head	" 23..	98	25	"	2	2,000	33	16	41	"
12	Garfield	" 22..	97	35	Fair......	2½	3,130	32	34	46	"
13	Brome	" 24..	99	32	"	2½	2,490	31	22	48	"
14	Success	" 21..	96	38	Stiff......	3	1,490	31	22	39½	"
15	Surprise	" 24..	99	32	Fair......	2½	2,300	31	12	46	"
16	Common	" 22..	97	36	"	3	1,670	29	38	45½	"
17	Champion	" 21..	96	36	Stiff......	3	1,690	29	18	38½	"
18	Excelsior	" 21..	96	34	"	3	1,680	27	24	38½	"
19	Trooper	Sept. 25..	100	30	"	3	2,310	26	42	47	"
20	Rennie's Improved	" 22..	97	34	Fair......	3	1,550	26	2	46	"
21	Vanguard	" 23..	98	33	Stiff......	2½	1,460	25	40	44	"
22	Phoenix	" 23..	98	31	Fair......	2	1,860	25	40	46½	"
23	Summit	" 28..	103	31	"	3½	1,820	24	28	47	"
24	Baxter	" 22..	97	37	Stiff......	3	2,080	21	12	46	"
25	Albert	" 1..	105	27	Fair......	3	1,800	20	40	47½	"
26	Petschora	" 1..	105	33	"	3	1,720	18	16	43	"
27	White Hulless	" 1..	105	26	"	2½	2,250	17	34	52	"
28	Royal	" 1..	105	24	"	3	2,110	16	22	46	"
29	Black Hulless	" 1..	105	27	"	2½	2,140	15	40	55½	"
30	Argyle	" 1..	105	38	"	3	2,470	15	10	43½	"

FIELD PLOTS OF BARLEY.

(All sown on summer fallow; soil, clay loam.)

Number.	Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield per Acre. Bush.	Yield per Acre. Lbs.
1	Trooper	1 acre	May 15	Aug. 18	95	15	..
2	Bolton	1 "	" 15	" 18	95	15	10
3	Royal	2 "	" 15	" 24	101	35	11
4	Beaver	1¾ "	" 15	" 24	101	33	3

TEST OF SMUT PREVENTIVES IN BARLEY.

This grain has proven very difficult of treatment with bluestone. Formalin gives better results, but so far has not proved a complete success.

Both the Canadian Thorpe and Odessa barley, used for seed, were very smutty.

Name of Variety.	How Treated.	Good Heads on 9 sq. ft.	Smut Heads on 9 sq. ft.
Odessa Barley	Not treated	349	26
"	Steeped 5 min. 4½ oz. formalin to 10 galls. water	254	1
"	" 15 4½ " " "	330	7
"	" 1 hour 4½ " " "	303	4
"	Sprinkled 4½ " " "	437	19
"	" 9 " " "	375	3
"	Treated with Massel Powder	435	9
Canadian Thorpe Barley	Not treated	278	88
" "	Steeped 5 min. 4½ oz. formalin to 10 galls. water	301	9
" "	" 15 4½ " " "	370	1
" "	" 1 hour 4½ " " "	235	21
" "	Sprinkled 4½ " " "	288	1
" "	" 9 " " "	354	3

EXPERIMENTS WITH PEASE.

Fifty-nine varieties of pease were sown, but two of them, viz., Wisconsin Blue and Grass pea were destroyed by cut-worm; thirteen of the other varieties were also more or less injured from the same cause, the last ten in the list being very much injured. With these exceptions, pease have escaped injury, and the returns are nearly equal to an average crop.

The size of the plots for this test was one-twentieth of an acre, and the soil was a rich, moist clay loam, summer-fallowed. All were sown between April 21 and 23.

PEASE—TEST OF VARIETIES.

No.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	In.		Bush.	Lbs.	Lbs.
1	King	Aug. 31	132	Rank	53	3	Large	44	....	60½
2	White Wonder	" 31	130	"	41	3	"	43	....	62½
3	Carleton	" 29	130	"	59	2½	Medium	42	40	60
4	Trilby	" 30	131	"	57	2	"	42	30	63
5	Prince	" 29	130	"	54	2½	Large	41	40	60½
6	Pearl	" 29	130	"	47	2½	Medium	40	....	62½
7	Archer	" 31	130	"	47	3	"	39	30	63
8	Bright	" 31	132	"	59	2¾	"	39	....	62
9	Chelsea	" 30	131	Fair	46	2	"	39	....	60
10	Elliot	" 28	129	Very weak	42	2½	Large	38	30	62
11	White Marrowfat	" 31	132	Rank	47	3	"	38	30	61
12	Agnes	" 28	129	Fair	39	3	"	38	....	59½
13	Prussian Blue	" 31	130	Rank	42	2	Medium	37	30	63½
14	Duke	" 31	130	"	41	2½	Large	37	10	62
15	German White	" 30	131	Weak	46	2	Small	36	40	62
16	Macoun	" 30	131	Rank	47	2½	Medium	36	20	61
17	Dover	" 31	130	"	42	3	Large	35	30	63
18	Prince Albert	" 30	129	"	41	2	Small	35	10	63
19	Perth	" 29	130	Fair	42	2½	Large	35	....	62
20	Herald	" 30	131	Rank	46	2¼	Small	34	30	61
21	Bruce	" 30	131	"	50	2½	Large	34	20	59½
22	Daniel O'Rourke	" 27	128	Weak	37	2	Small	33	50	62
23	Golden Vine	" 29	130	"	47	2	"	33	20	60½
24	Fergus	" 30	131	Rank	47	2½	Medium	33	10	61½
25	Multiplier	" 30	129	"	47	2	Small	32	50	62
26	Bedford	" 29	130	Fair	42	2	Medium	32	40	62½
27	Harrison's Glory	" 29	130	Very weak	23	3	Large	32	30	61½
28	Victoria	" 30	129	"	47	2½	Medium	32	20	62½
29	Elder	" 30	129	Rank	36	2½	"	32	....	62½
30	Field Gray	" 26	125	Fair	34	2	Small	31	40	60
31	Chancellor	" 28	129	Very weak	34	2	"	31	30	61
32	Creeper	" 29	130	Weak	49	2	"	31	20	61
33	Vincent	" 31	130	"	32	3	Large	31	20	63
34	Crown	" 28	129	Fair	31	2	Small	31	10	62
35	Centennial	" 31	130	Rank	44	3	Large	31	....	63½
36	Kent	" 30	131	Very weak	45	3	"	31	....	62
37	English Gray	" 31	130	Weak	36	2½	Medium	30	50	60½
38	Maple	" 31	132	Very weak	50	3	"	30	40	60
39	Mummy	" 27	128	Weak	24	3	Large	30	....	62
40	Lanark	" 31	132	Rank	42	3	"	30	....	61
41	Pride	" 28	129	Fair	45	2½	"	29	50	63
42	Fenton	" 30	131	Rank	44	2½	"	29	40	62½
43	Mackay	" 29	128	"	45	3	"	28	40	62½
44	Gregory	" 31	132	"	57	3	Med m	26	30	63½
45	Nelson	" 29	128	"	30	2½	"	26	....	63
46	Alma	" 28	127	"	40	2½	Small	25	10	62
47	Early Britain	" 30	129	"	42	2½	Large	25	10	60
48	Picton	" 29	128	Fair	43	2½	Medium	24	40	62½
49	Paragon	" 28	127	"	13	2½	"	22	50	61½
50	Arthur	" 28	127	Weak	39	2½	Small	22	40	62
51	Black-eyed Marrowfat	" 29	130	Rank	48	3	Large	22	40	58½
52	Canadian Beauty	" 31	130	Fair	46	2½	Medium	21	30	62
53	New-Potter	" 28	127	"	40	3	"	18	30	62½
54	Cooper	" 30	129	"	42	2	"	17	40	62½
55	Oddfellow	" 31	130	Rank	49	2	Small	17	10	62
56	Elephant Blue	" 28	127	Weak	27	3	Medium	16	30	61½
57	French Canner	" 27	126	"	34	3	Small	12	40	61

EXPERIMENTS WITH FLAX.

Like all other small seeds, flax germinated very unevenly this year, in some instances the plants were over a foot apart. This greatly lessened the yield of both seed and fibre. Owing to the large number of weeds which came up in the vacancies between the plants, it was thought advisable to pull all the plots instead of cutting one half of them with a binder as is usually done.

All the plants were sown in rich black loam, which had been summer-fallowed. The size of the plots was one-twentieth of an acre.

Variety.	Amount of Seed Sown per acre.	Date of Sowing.	Length of Straw.	Date when pulled for fibre.	Weight of Straw when pulled for fibre, per acre.	Yield of Seed per acre.		Weight per Bushel.
	Lbs.		Inches.		Lbs.	Bush.	Lbs.	Lbs.
Flax	40	April 28..	20 to 30	Sept. 1...	1,600	6	4	53
"	80	" 28..	20 to 30	" 1...	2,500	6	4	53
"	40	May 5..	20 to 30	" 1...	2,100	6	24	54
"	80	" 5..	20 to 30	" 1...	2,700	6	4	54
"	40	" 12..	20 to 30	" 1...	3,300	7	8	53
"	80	" 12..	20 to 30	" 1...	2,700	6	44	53½
"	40	" 19..	20 to 30	" 1...	2,500	5	40	54
"	80	" 19..	20 to 30	" 1...	3,500	6	44	54

CANARY SEED.

A plot of Canary seed was sown on May 29, but owing to the dry season the seed did not germinate in time for the grain to ripen.

BUCKWHEAT.

Three varieties of Buckwheat were sown on May 26, but the seed lay dormant until July, and although all the varieties blossomed freely, no seed was formed.

EXPERIMENTS WITH INDIAN CORN.

The soil selected for a comparative test of varieties was not suitable for corn, being too level, and for that reason the yield was below the average. The location selected for the field crop was a warm soil, with a decided slope to the south, and the yield there was much better.

The corn was several inches above the ground on June 8, and the eight degrees of frost which was then experienced, cut it level with the ground, but it quickly recovered, and was apparently none the worse for it.

Besides the plots devoted to the test of varieties, 2½ acres were cured as dry fodder, and several bushels of Squaw corn, a very early native variety, was ripened for seed purposes. This variety is much used as a table corn throughout the province.

The land selected for the test of varieties was a black loam which produced a crop of potatoes in 1899. It was ploughed seven inches deep in early spring, and the surface cultivated until May 19, when the drilled plots were sown in rows three feet apart, with a common wheat drill, and the hilled plots planted with a hoe three feet apart each way. Owing to the hilled plots being planted too shallow, the seed did not germinate until the rains, which came late in June. The yield per acre has been calculated from the weight of crop cut from one row 66 feet long.

Indian Corn—Test of Varieties.

	Name of Variety.	Character of Growth.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Late Milk,	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
			In.							Tons.	Lbs.	Tons.	Lbs.
1	Thoroughbred White Flint...	Rank.	86	Very leafy	Aug. 24	......	......	......	In tassel..	29	1,400	9	40
2	Ruby Mexican...	Fair..	79	Fair.. ...	" 2	Aug. 10	Aug. 24	Aug. 30	L. Milk ..	24	620	12	200
3	North Dakota White.........	.	75	Very leafy	" 15	" 21	" 30	.....	E. " ..	22	1,100	10	1,120
4	Pearce's Prolific..	Rank.	80	" "	" 10	" 15	" 24	Aug. 31	L. " ..	22	220	8	1,820
5	Early Yellow, Long-eared....	" .	75	" "	" 15	" 20	" 24	Sept. 3	L. " ..	22	220	7	300
6	Early Mastodon.	Fair..	88	Fair......	" 28	......	......	......	In tassel..	20	920	7	300
7	Compton's Early.	Rank.	83	Very leafy	" 15	Aug. 20	Aug. 28	......	E. Milk..	20	700	8	500
8	Mitchell's Extra Early.........	Weak	54	" "	" 2	" 8	" 15	Aug. 24	L. " ..	20	480	8	940
9	Sanford....	" .	72	" "	" 15	" 23	" 30	Sept. 3	L. " ..	19	1,160	8	500
10	King of the Earliest......	Fair..	76	" "	" 22	" 29	Sept. 3	... ...	E. " ..	19	500	8	500
11	Angel of Midnight..........	" .	92	Fair......	" 16	" 22	Aug. 29	....	E. " ..	18	1,620	7	1,840
12	Canada White Flint.........	" .	85	"	" 15	" 23	" 29	.... .	E. " ..	18	1,180	8	500
13	Superior Fodder.	" .	72	Very leafy	" 25	......	....	....	In tassel..	17	1,640	10	900
14	North Dakota Yellow........	Weak	70	" "	" 2	Aug. 10	Aug. 24	Aug. 30	L. Milk ..	17	100	9	100
15	Giant Prolific Ensilage.......	Rank.	72	Fair......	" 24	......	....	.....	In tassel..	16	1,440	8	1,600
16	Selected Leaming	Fair. .	76	"	" 18	Aug. 23	Aug. 27	Sept. 3	L. Milk ..	16	120	8	1,380
17	Kendall's Early Giant	" .	62	Very leafy	" 8	" 20	" 25	" 2	L. " ..	16	120	7	1,400
18	Pride of the North	" .	96	Fair......	" 24	" 27	Sept. 3	... .	E. " ..	15	1,900	8	940
19	Mammoth eight-rowed Flint ...	Rank,	82	Very leafy	" 12	" 22	Aug. 29	.. ....	E. " ..	15	1,900	7	1,400
20	Early Butler....	Fair..	86	Fair......	" 16	" 22	" 31	....	E. " ..	15	1,240	7	1,620
21	Cloud's Early Yellow..	" .	91	"	" 19	" 24	" 30	......	E. " ..	15	1,240	10	20
22	Longfellow......	Rank.	84	Very leafy	" 15	" 20	" 29	....	E. " ..	15	1,020	7	1,840
23	Champion White Pearl..........	Fair..	101	Fair.. ...	" 23	" 30	....	.... .	In silk....	15	800	8	280
24	Red Cob Ensilage	Rank.	75	Leafy	Sept. 3	....	..... .	.... .	In tassel..	15	360	7	300
25	Mammoth Cuban	" .	93	Few......	Aug. 22	Aug. 27	Sept. 3	.. ...	E. Milk ..	14	1,700	8	1,820
26	Salzer's All Gold.	Fair..	76	Leafy	" 15	" 24	Aug. 30	..... .	E. " ..	13	840	6	540
27	White Cap Yellow Dent ...	" .	76	Few......	" 15	" 22	" 27	. . .	E. " ..	12	1,520	9	920
28	Extra Early Huron Dent...	" .	84	"	" 15	" 24	" 31	Sept. 3	L. " ..	12	1,520	7	1,840
29	Evergreen Sugar.	Rank.	64	Very leafy	" 24	... .	....	....	In tassel..	12	420	3	1,260
30	Extra Early Szekely..... .	Weak	61	Leafy	" 3	Aug. 8	Aug. 18	Aug. 24	L. Milk ..	11	1,100	5	1,000
31	Country Gentleman......	Fair..	67	"	" 20	" 30	Sept. 3	.... .	E. " ..	11	1,100	6	540
32	Yellow Six-weeks	" .	51	"	" 8	" 15	Aug. 20	Aug. 31	L, " ..	10	900	6	1,200
33	Salzer's Earliest Ripe..........	" .	68	"	" 2	" 10	" 24	" 30	L. " ..	8	500	7	1,180

INDIAN Corn Sown at Different Distances Apart.

Name of Variety.	Distance between rows.	Height.	Condition When Cut.	Weight per acre in rows.		Weight per acre in hills.	
	Inches.	Inches.		Tons.	Lbs.	Tons.	Lbs.
Longfellow	21	73	Late milk...	17	697	15	548
"	28	73	" ..	14	1,700	13	1,437
"	35	73	" ..	16	1,943	14	1,643
"	42	73	" ..	14	1,417	14	97
Selected Leaming....	21	72	" ..	18	1,714	18	960
"	28	72	" ..	17	1,640	16	1,377
"	35	72	" ..	17	395	16	1,716
"	42	72	" ..	14	1,040	13	1,908
Champion White Pearl	21	82	Early milk..	24	1,028	21	1,368
" "	28	82	" ..	19	600	18	1,620
" "	35	82	" ..	14	1,869	14	964
" "	42	82	" ..	15	548	14	1,894

AVERAGE Yield at Different Distances.

——	In rows.		In hills.	
	Tons.	Lbs.	Tons.	Lbs.
Average yield of green corn, 21 inches apart	20	479	18	958
" " " 28 "	17	646	16	811
" " " 35 "	16	735	15	774
" " " 42 "	14	1,668	14	633

FIELD ROOTS.

The past season has been a very unfavourable one for all classes of field roots. The very loose and dry condition of the soil at sowing time caused it to drift with the wind, in some instances carrying the seed into adjoining fields. No rain fell between the date of sowing and June 26 so that very few seeds germinated until July 1, making the season much too short for any of the field roots.

EXPERIMENTS WITH TURNIPS.

In common with other field roots, turnips have given a small yield, this year the returns being about one-half of an ordinary crop. The soil chosen for these experiments was a rich clay loam ; the previous crop was fodder corn. Two sowings were made of each variety. The first plots were sown May 19, the second on June 2, and the roots from both were pulled on October 29. The estimate of yield has been made from the product of two rows each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield Per Acre. — 1st Plot.		Yield Per Acre. — 1st Plot.		Yield Per Acre. — 2nd Plot.		Yield Per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Champion Purple Top	12	1,080	418	..	10	1,384	356	24
2	Giant King	10	1,120	352	..	8	1,160	286	..
3	Webb's New Renown	10	1,120	352	..	15	360	506	..
4	Perfection Swede	10	1,120	352	..	12	1,872	431	12
5	Magnum Bonum	10	856	347	36	9	1,800	330	..
6	Carter's Elephant	10	64	334	24	8	1,160	286	..
7	Hartley's Bronze	9	1,800	330	..	13	400	440	..
8	Prize Purple Top	9	1,800	330	..	12	1,344	422	24
9	Selected Champion	9	1,800	330	..	15	360	506	..
10	Imperial Swede	9	480	308	..	13	400	440	..
11	Kangaroo	9	480	308	..	10	1,120	352	..
12	Drummond Purple Top	9	216	303	36	10	328	338	48
13	Prize Winner	8	1,160	286	..	12	1,080	418	..
14	Skirving's	8	1,160	286	..	15	1,680	528	..
15	Sutton's Champion	8	1,160	286	..	11	440	374	..
16	East Lothian	8	368	272	48	13	136	435	36
17	Elephant's Master	7	520	242	..	9	480	308	..
18	Shamrock Purple Top	8	104	268	24	14	1,040	484	..
19	Selected Purple Top	7	1,048	250	48	11	704	378	24
20	West Norfolk Red Top	7	1,048	250	48	12	1,608	426	48
21	New Arctic	7	1,576	259	36	9	480	308	..
22	Marquis of Lorne	6	1,992	233	12	11	440	374	..
23	Monarch	6	1,200	220	..	8	1,160	286	..
24	Mammoth Clyde	6	936	215	36	11	440	374	..
25	Jumbo	5	1,880	198	..	11	704	378	24
26	Hall's Westbury	5	1,088	184	48	15	1,680	528	..
27	Bangholm Selected	5	560	176	..	14	1,040	484	..
28	Halewood's Bronze Top	4	1,240	154	..	11	1,760	396	..

EXPERIMENTS WITH MANGELS.

The soil on which the mangels were grown was a rich clay loam and the previous crop was fodder corn. Twenty-three varieties were tested. Two sowings were made of each variety, the first on May 19, the second on June 2, and the roots from both were pulled October 2. The seed was sown in drills thirty inches apart, and the yield has been calculated from the weight of roots gathered from two rows each 66 feet long.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield Per Acre. — 1st Plot.		Yield Per Acre. — 1st Plot.		Yield Per Acre. — 2nd Plot.		Yield Per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Mammoth Oval Shaped	14	1,832	497	12	15	1,416	523	36
2	Mammoth Long Red	13	928	448	48	13	136	435	36
3	Selected Mammoth Long Red	13	664	444	24	21	240	704	..
4	Giant Yellow Globe	12	816	413	36	12	1,608	426	48
5	Giant Yellow Intermediate	12	552	409	12	11	440	374	..
6	Norbiton Giant	12	552	409	12	12	816	433	36
7	Prize Mammoth Long Red	11	1,760	396	..	13	400	440	..
8	Lion Yellow Intermediate	11	704	378	24	8	1,688	294	48
9	Mammoth Yellow Intermediate	11	704	378	24	.....	.....	.....	.....
10	Warden Orange Globe	11	176	369	36	8	632	277	12
11	Giant Yellow Half Long	10	1,648	360	48	11	1,232	387	12
12	Gate Post	10	1,384	356	24	15	888	514	48
13	Champion Yellow Globe	10	1,384	356	24	12	288	404	48
14	Half Long Sugar Rosy	10	1,384	356	24	11	704	378	24
15	Gate Post Yellow	10	328	338	48	8	1,680	294	48
16	Canadian Giant	10	328	338	48	13	1,720	462	..
17	Ward's Large Oval Shaped	9	744	312	24	13	928	448	48
18	Sutton's Prize Winner	8	1,952	299	12	11	1,760	396	..
19	Golden Fleshed Tankard	8	1,952	299	12	7	1,312	255	12
20	Yellow Fleshed Tankard	8	1,688	294	48	8	896	281	36
21	Half Long Sugar White	7	1,840	264	..	12	1,608	426	48
22	Yellow Intermediate	5	32	167	12	13	664	444	24
23	Red Fleshed Tankard	4	976	149	36	17	1,904	598	24

EXPERIMENTS WITH CARROTS.

Nineteen varieties of carrots were tested this year. As usual two sowings were made of each variety, but owing to the drought the first sown seed germinated so unevenly that accurate returns could not be obtained.

The soil on which these roots were sown was a rich clay loam which had produced a crop of corn in 1899. The estimate of yield has been made from the roots produced on two rows each 66 feet long.

The first sowing was made on May 19 and the second on June 2. The seed was sown in drills 18 inches apart. All were pulled on October 4.

CARROTS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre 2nd Sowing.		Yield per Acre 2nd Sowing.	
	Tons.	Lbs.	Bush.	Lbs.
Green Top White Orthe	5	1,880	198	..
Half Long Chantenay	5	1,000	183	20
Giant White Vosges	5	1,000	183	20
Early Gem	5	1,000	183	20
Guerande or Ox-Heart	5	560	176	..
Half Long White	5	560	176	..
Improved Short White	4	1,240	154	..
Carter's Orange Giant	4	1,240	154	..
New White Intermediate	4	1,240	154	..
Iverson's Champion	4	360	139	20
Yellow Intermediate	3	1,480	124	40
White Belgian	3	1,040	117	20
Long Scarlet Altringham	3	600	110	..
Mammoth White Intermediate	3	600	110	..
Ontario Champion	3	160	102	40
Scarlet Intermediate	3	160	102	40
Scarlet Nantes	2	1,720	95	20
Long Orange or Surrey	2	1,720	95	20
White Vosges Large Short	2	1,280	88	..

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were tested. The soil was a clay loam. The first plots were sown on May 19, the second on June 2, and all were pulled on October 4. The yield per acre has been calculated from two rows, each 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
	Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Red Top Sugar	10	592	343	12	11	1,232	387	12
Improved Imperial	10	328	338	48	13	136	435	36
Danish Red Top	10	64	334	24	14	1,040	484	..
Wanzleben	9	744	312	24	13	400	440	..
Danish Improved	8	632	277	12	10	1,384	356	24
Vilmorin's Improved	8	368	272	48	8	632	277	12

EXPERIMENTS WITH POTATOES.

Although the yield of potatoes this year was slightly under the average of the past four years, every variety germinated well, the growth was a remarkably uniform one and the experiment as a comparative test of varieties was successful.

The average yield of twenty-five of the most productive varieties covering a period of four years, is also given.

The previous crop was fodder corn. There was no injury from rot, and practically all were marketable. The yield per acre has been estimated in each case from the product of one row 66 feet long.

All the varieties were planted on May 22 in rich clay loam without manure and were dug on September 20.

POTATOES—TEST OF VARIETIES.

No.	Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Total Yield per Acre. Bush.	Lbs.	Form and Colour.
1	Dakota Red	Rank	Not ripe	Large	Poor	374	..	Round, red.
2	Delaware	"	"	Medium	Fair	363	..	Long, russet.
3	Seattle	"	"	"	"	348	20	" white.
4	Carman, No. 1	"	"	Large	"	348	20	" "
5	New Variety, No. 1	Fair	"	"	"	344	40	Round "
6	Troy Seedling	"	"	Medium	Poor	337	20	Long "
7	Brownell's Winner	Rank	"	Large	Good	333	40	" red.
8	Seedling, No. 7	"	Sept. 12	Medium	Poor	330	..	Round, red.
9	Lizzie's Pride	Fair	" 12	Large	Good	311	40	Long "
10	Money Maker	Rank	" 8	Small	Fair	311	40	" white.
11	Seedling, No. 230	"	" 10	"	Good	311	40	Round, white.
12	Carman, No. 3	"	" 11	Medium	Fair	308	..	Long "
13	Clarke's No. 1	Fair	" 13	"	"	308	..	" pink.
14	Irish Daisy	Rank	" 11	"	"	304	20	" white.
15	Rural Blush	"	Not ripe	Large	Good	304	20	" red.
16	Northern Spy	Fair	"	Medium	"	304	20	Oval, red.
17	Irish Cobbler	"	Sept. 5	"	Fair	300	40	Round, russet.
18	Uncle Sam	"	Not ripe	Large	"	300	40	Long, white.
19	Early Harvest	"	"	Medium	Poor	297	..	" "
20	Enormous	"	"	"	"	297	..	Flat "
21	Early Six Weeks	Weak	Sept. 5	"	Good	293	20	Oval, red.
22	State of Maine	Fair	Not ripe	Large	Poor	293	20	Long, white.
23	Green Mountain	"	"	Medium	Good	293	20	Oval "
24	Hale's Champion	"	"	"	Poor	293	20	Round "
25	Cambridge Russet	"	Sept. 11	"	Fair	293	20	Long, russet.
26	Early St. George	Rank	" 12	"	Good	293	20	" pinkish.
27	Houlton Rose	Fair	" 11	"	Fair	293	20	Oval, long, red.
28	Columbus	Rank	Not ripe	"	Good	286	..	" "
29	Great Divide	Fair	Sept. 14	"	Fair	286	..	Long, white.
30	Holborn Abundance	Rank	Not ripe	"	Good	286	..	Round, russet.
31	Rose No. 9	Fair	"	Large	Fair	282	20	Long, red.
32	Reeve's Rose	Rank	Sept. 12	Medium	Poor	282	20	Flat, pink.
33	Burnaby Seedling	"	Not ripe	"	Fair	275	..	Oval "
34	Prolific Rose	"	Sept. 10	"	Poor	275	..	Round, red.
35	Gem of Aroostook	"	" 11	"	Fair	271	20	Long, pink.
36	Brown's Rot Proof	"	Not ripe	Large	Good	271	20	" red.
37	Early Michigan	Fair	Sept. 5	Medium	Fair	267	40	" white.
38	Pride of the Market	"	Not ripe	"	Good	264	..	Oval "
39	Dreer's Standard	Rank	"	Small		260	20	Round "
40	Lightning Express	"	Sept. 11	Medium		260	20	Oval, pink.
41	Quaker City	"	Not ripe	"	Fair	256	40	Flat, white.
42	Sir Walter Raleigh	Fair	"	Large	Poor	256	40	Round "
43	Early Market	"	Sept. 5	Medium	Good	256	40	Oval, pink.
44	Penn. Manor	"	" 14	"	"	256	40	" long, red.
45	Early White Prize	Rank	" 5	"	Fair	253	..	" white.
46	Vanier	Fair	Not ripe	"	"	253	..	" red.
47	Prize Taker	"	Sept. 12	"	Good	253	..	Round, red.
48	Early Pride	"	Not ripe	"	Fair	249	20	Oval "
49	Earliest of All	"	Sept. 5	"	"	249	20	" long, red.
50	Late Puritan	"	" 4	"	"	249	20	Long, white.
51	Vigorosa	"	" 12	"		245	40	Flat, red.
52	Hayden's Seedling	"	Not ripe	"	Poor	245	40	Long, white.
53	American Wonder	"	"	"	Good	242	..	"
54	Maule's Thoroughbred	"	Sept. 14	"	"	242	..	Oval, long, red.
55	Harvest King	"	" 12	"	Poor	242	..	Round, white.
56	Early Puritan	"	Not ripe	"	Good	238	20	Long "
57	I. X. L.	"	"	Large	Fair	238	20	" red.
58	Reading Giant	Rank	Sept. 5	Small	"	238	20	Round, red.
59	Livingston's Beauty	Fair	" 14	Medium	Good	238	20	Flat, white.
60	Daisy	"	" 5	"	"	238	20	Oval, long, red.
61	Beauty of Hebron	"	" 5	"	"	238	20	" "
62	Lee's Favourite	"	Aug. 26	"	"	234	40	Round, pinkish.
63	White Beauty	"	Sept. 5	Small	"	231	..	Long, white.
64	Pride of the Table	Weak	Not ripe	Medium	Fair	231	..	Round, pink.
65	Good News	Fair	Sept. 15	"	Good	231	..	Oval, red.
66	Chas. Downing	"	" 5	Small	Wet	231	..	Round, white.
67	Everett	"	" 12	Medium	Fair	231	..	Long, red.
68	Seneca Beauty	"	Not ripe	"	Good	227	20	Flat, pink.
69	Ohio Junior	Weak	Sept. 5	"	Fair	223	40	Oval, red.
70	Rural, No. 2	Fair	Aug. 12	Large	Good	220	..	Flat, round.
71	Queen of the Valley	"	Sept. 8	Medium	"	220	..	" long, red.

POTATOES—TEST OF VARIETIES—*Concluded.*

No.	Name of Variety.	Character of Growth.	When Matured.	Average Size.	Quality.	Total Yield per Acre. Bush.	Lbs.	Form and Colour.
72	Early Rose	Weak	Sept. 5	Medium	Fair	220	..	Oval, long red.
73	Empire State	Fair	" 12	"	Good	216	20	" white.
74	Vick's Extra Early	"	Not ripe	"	"	216	20	" pinkish.
75	New Queen	"	Sept. 1	"	"	212	40	Flat "
76	Chicago Market	"	Not ripe	"	"	209	..	Long, white.
77	20th Century	"	Sept. 12	"	Poor	209	..	" russet.
78	Harbinger	"	" 5	"	Fair	205	20	Oval, red.
79	World's Fair	"	Not ripe	"	Good	205	20	Flat, white.
80	American Beauty	Rank	"	Small	Poor	201	40	Long "
81	Clay Rose	Fair	"	Medium	Good	201	40	Red, round.
82	Maggie Murphy	"	"	Large	"	201	40	Long, red.
83	Bovee	Weak	Sept. 5	Medium	Fair	201	40	Oval, pink.
84	Burpee's Extra Early	Fair	Aug. 28	"	"	201	40	" red.
85	Flemish Beauty	"	Sept. 14	"	Good	201	40	" long, red.
86	Pearce's Prize Winner	"	" 11	"	"	198	..	Round, white.
87	Polaris	"	" 8	"	Fair	198	..	Oval, red.
88	Swiss Snowflake	"	Not ripe	Small	"	198	..	Round, white.
89	Honeoye Rose	"	Sept. 5	Medium	Good	190	40	Oval, long, red.
90	Algoma	"	" 8	"	"	190	40	" "
91	Country Gentleman	"	" 5	"	Fair	190	40	Flat, pink.
92	Early Sunrise	"	" 5	"	"	187	..	Oval, long, red.
93	Russell Seedling	"	" 12	Small	Good	187	..	Round, white.
94	Early Fortune	Weak	" 5	Medium	Fair	183	20	Oval, red.
95	American Giant	Fair	" 12	Small	Good	183	20	Long, white.
96	Pearce's Extra Early	"	" 10	Medium	Fair	183	20	" red.
97	Livingston	Weak	Not ripe	"	Good	179	40	" pink.
98	Stourbridge Glory	Rank	"	Small	Fair	176	..	Round, russet.
99	Thorburn	"	Sept. 5	Medium	"	172	20	" pinkish.
100	Early Ohio	Weak	Aug. 20	"	"	168	40	" "
101	Early Northern	"	Sept. 5	"	Good	168	40	Oval, red.
102	Fillbasket	"	Not ripe	"	Fair	165	..	" "
103	General Gordon	Fair	Sept. 15	"	"	165	..	" "
104	Wonder of the World	Weak	" 1	"	Good	165	..	" rose.
105	Bill Nye	"	Aug. 28	"	Fair	161	20	" red.
106	Rochester Rose	Rank	Sept. 5	"	Good	150	20	Long, pink.
107	McIntyre	"	Not ripe	Small	Poor	146	40	" white.
108	Sharpe's Seedling	Weak	Aug. 28	Medium	Good	146	40	Oval, pink.
109	Record	Rank	Not ripe	Small	Fair	99	..	Long, white.

AVERAGE YIELD of Potatoes during four Years.

Variety.	Years included.	Average Yield per Acre.	Quality.	Colour.
Seedling No. 7	1897-98-99-1900	402 25	Good	Red.
Delaware	" "	385 ..	Fair	Russet.
Dreer's Standard	" "	371 5	Good	White.
State of Maine	" "	356 7	"	"
Clarke's No. 1	" "	353 50	Fair	Pink.
New Variety No. 1	" "	352 55	Poor	White.
Green Mountain	" "	351 5	"	"
Late Puritan	" "	350 10	"	"
Irish Daisy	" "	337 20	"	"
Burnaby Seedling	" "	331 50	"	Pink.
Chicago Market	" "	331 50	Good	White.
Money Maker	" "	330 ..	Poor	"
Troy Seedling	" "	330 ..	"	"
Lizzie's Pride	" "	327 15	Good	Red.
Dakota Red	" "	324 30	Poor	"
Vanier	" "	322 50	Good	"
Great Divide	" "	318 5	"	White.
Rural Blush	" "	314 25	Fair	Red.
Clay Rose	" "	310 45	Poor	"
Flemish Beauty	" "	309 50	Fair	"
Brownell's Winner	" "	304 20	"	"
General Gordon	" "	303 30	Good	"
Carman No. 3	" "	297 55	Fair	White.
Northern Spy	" "	292 25	Poor	Red.
Seedling No. 230	" "	292 25	Good	White.
Uncle Sam	" "	291 50	Poor	"
American Giant	" "	289 40	Good	"

GRASSES.

Owing to the severe drought in spring and early summer, the yield of hay on the Experimental Farm was the smallest on record, the older fields failing to produce enough to pay for cutting. A newly-seeded field of four acres, in a moist situation, gave the best returns, viz., 1 ton 589 pounds per acre of Awnless Brome grass. The abundant rains later in the season produced an aftermath which was rank in growth, and some of it was sufficiently tall for mowing, but the hay from it was not found equal in quality to the first cutting.

The only clover which reached a sufficient height for mowing was Lucerne or Alfalfa. A plot of this grew 27 inches high, but accurate returns of the yield could not be obtained owing to heavy rains at the time of curing.

SEEDING BROME ON VERY SANDY LAND.

It being desirable to seed down an exposed field of thirteen acres of light sandy land with Brome Grass, and wishing to avoid loss from drifting soil, the plan of ploughing in the seed lightly with a three-furrow gang plough was tried with success. The field had been summer-fallowed during 1899, and early in April the Brome Seed was sown broadcast alone, at the rate of 15 pounds per acre ; this was ploughed in at once two inches deep, and left quite rough. The seed remained dormant until the June rains, but the soil did not drift. In July the young plants appeared above ground, and by autumn the field gave abundant pasture.

GRASS AS A PREVENTIVE OF DRIFTING SOIL.

The past season was exceptional for the large amount of injury done through drifting soil, thousands of acres of crop, both east and south-west of this place, being almost entirely destroyed from this cause.

On the Experimental Farm the benefits of seeding to grass was very evident. Knolls and other exposed spots which, in the early history of the farm, were often so badly blown as to lose the seed, were so protected by the fiber of grass plants ploughed under in former years, that the injury was scarcely noticeable.

It is evident that one of the best preventives of injury from drifting soil is to seed down to grass every few years.

MILLETS.

Seven varieties of millets were grown this year, although some of them failed to germinate until after the June rains. They all made a heavy return.

From several years' experience, it appears that millets are quite reliable in this climate if sown on summer-fallow, or on any naturally moist land, newly ploughed. On dry land, or on land which has been ploughed for some time, the millet seed germinates so slowly that the weeds usually choke it out. The Japanese variety was sown in drills 9 inches apart, the others 7 inches apart ; the size of the plots was one-twentieth of an acre, and the soil was a clay loam which had been summer-fallowed.

MILLETS—Test of Varieties.

Variety.	When sown.	When cut.	Height.	Yield per Acre.
			Inches.	Tons Lbs.
Italian or Indian	May 25	Sept. 3	48	5 480
Golden	" 25	" 3	52	4 1,978
Hungarian	" 23	" 3	46	4 600
French White	" 23	" 3	55	3 1,880
Japanese	" 23	" 3	52	2 1,480
Algerian	" 25	" 3	61	1 1,360
Pearl	" 23	" 3	46	1 1,280

BROOM CORN AND SORGHUM.

One plot each of these were grown for fodder purposes. Both made a large and rapid growth, but owing to the excessive rains, they did not cure well. They were both sown in drills 28 inches apart; the size of the plots was one-twentieth of an acre, the soil a clay loam which had been summer-fallowed.

BROOM CORN.

Variety.	When sown.	When cut.	Height.	Yield dry per Acre.
				Tons Lbs.
Broom Corn	May 25	Sept. 3	82	2 1,617

SUGAR CANE OR SORGHUM.

Variety.	When sown.	When cut.	Height.	Yield per Acre.
			Inches.	Tons Lbs.
Early Amber	May 26	Sept. 3	72	3 1.870

EXPERIMENTS WITH SOJA BEANS AND HORSE BEANS.

Both of these were sown on May 19, and germinated at once ; but the Soja Beans were completely destroyed by the frost of June 8, and the Horse Beans were uninjured. They made a rapid growth in spite of the drought, and when cut on September 17, they were well loaded with beans, nearly ripe.

The land was summer-fallowed. The size of the plots was one-fortieth of an acre each.

HORSE BEANS SOWN AT DIFFERENT DISTANCES.

Variety.	Sown.	Rows.	Height.	Cut.	Yield per acre green.	
					Tons.	Lbs.
English Horse Beans	May 19	21 inches apart	40	Sept. 17	6	400
" " "	" 19	28 " "	40	" 17	6	800
" " "	" 19	35 " "	40	" 17	7	

SAND VETCH.

A plot of this plant was sown, but the germination was so uneven that accurate returns of the yield could not be obtained. The few plants that grew had a very spreading habit, and would have been difficult to harvest. The length of the plants was 32 inches. The soil was a clay loam, summer-fallowed.

PROLIFIC COW PEA.

A one-twentieth acre plot of this plant was sown, but from some unknown cause very few seeds germinated. The plants which grew were only 11 inches high, and resembled Wax Beans, but they did not reach the blossoming stage. The soil was a clay loam, summer-fallowed.

SUNFLOWERS.

About half an acre of Mammoth Russian Sunflowers were grown on the farm this year. The soil was a clay loam, summer-fallowed. They were sown on May 30, but owing to the dry season they did not germinate until the June rains, and only about 25 per cent ripened before severe frost. The hail-storm on August 17, cut off a large proportion of the heads. They were harvested on October 10. The height was eight feet, and the yield 3 tons 40 pounds of green heads per acre.

CATTLE.

The cattle on the Brandon farm have kept in good health during the past year, and the herd now consists of the following animals :—

Name of Animal.	Breed.	Age.	Weight.
			Pounds.
Lord Lassie	Shorthorn	3 years	1,670
Violet	"	4 "	1,260
Mary of Brandon	"	14 months	710
Esther	"	3 years	1,180
Prairie Buttercup	"	7 months	465
Eva	"	5 "	350
Prince Charlie	Ayrshire	6 "	445
Dandy	"	11 years	1,350
Primrose	"	2	1,065
Sandy	"	14 months	1,050
Bonnie Doon	"	10 "	510
Queen of Brandon	Holstein	2 years	1,170
Siepkje of Brandon	"	2 "	1,320
Brandon Friar	"	14 months	950
Richard Lyons	Guernsey	3 years	1,820
Lady Jane Grey	Grade	12 "	1,280
Pansy	"	6 "	1,260
Violet	"	4 "	1,345
Rose	"	2 months	300
Reddy (Steer)	"	22 "	950
Dick "	"	13 "	840

EXPERIMENT IN FEEDING STEERS.

DEHORNING AND ITS EFFECTS ON CATTLE.

Fifteen steers were selected for this test. They were apparently Shorthorn grades. Four in each lot were coming three years old and one coming four years old, when the feeding started. They fairly represented the better class of animals raised in the province. These were divided into three groups of five each. Ten of these were dehorned, and five were not dehorned. One of the dehorned groups was fed in a stall loose ; the others were tied up alongside of the group with horns.

The dehorning operation was performed as follows : The animal was placed in a strongly built stanchion, a stout halter put on and a rope run from the halter to a ring in the floor, the hair at the back of the horn was turned back and the cut made so that the hair lapped over the scar. A common carpenter's saw newly sharpened, was used. The cattle were kept in the barn after the operation. They all bled profusely, but only one or two lost their appetite, and these only for a meal or two. The wounds in every instance healed quickly and without any offensive odour.

The ten animals were tied in double stalls with chains. The five untied animals were confined in a stall 10 feet by 28 feet and were fed in a trough running the length of the stall.

When purchased on November 20, 1899, the steers cost 3½ cents per pound live weight, and sold on May 12, 1900, for 3¾ cents per pound.

Owing to the comparatively low price of fat cattle in the spring, all were fed at a loss, but the experiment, as a test of dehorning, was a very successful one, and would lead us to the conclusion that dehorning has very little effect on the animal either one way or the other.

RATIONS FED.

First Period—November 24 to December 15, 1899.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 lbs.	10 lbs.	1,050 lbs.
Hay	25 ″	5 ″	525 ″
Ensilage	100 ″	20 ″	2,100 ″
Chop	35 ″	7 ″	735 ″

Second Period—December 15 to January 12, 1899.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 Lbs.	10 Lbs.	1,400 Lbs.
Hay	25 ″	5 ″	700 ″
Ensilage	100 ″	20 ″	2,800 ″
Chop	35 ″	7 ″	980 ″

Third Period—January 12 to February 9, 1900.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 Lbs.	10 Lbs.	1,400 Lbs.
Hay	25 ″	5 ″	700 ″
Ensilage	100 ″	20 ″	2,800 ″
Chop	40 ″	8 ″	1,260 ″

Fourth Period—February 9 to March 9, 1900.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 Lbs.	10 Lbs.	1,400 Lbs.
Hay	25 ″	5 ″	700 ″
Ensilage	100 ″	20 ″	2,800 ″
Chop	45 ″	9 ″	1,260 ″

Fifth Period—March 9 to April 6, 1900.

Daily Rations.	5 Steers.	1 Steer.	Total Fed to Each Lot of 5 for Total Period.
Straw	50 Lbs.	10 Lbs.	1,400 Lbs.
Hay	25 ″	5 ″	700 ″
Ensilage	100 ″	20 ″	2,800 ″
Chop	50 ″	10 ″	1,400 ″

COMPARATIVE GAINS.

Dehorned—Tied.	Date.	Weight.	Gain.	Total Gain.
Original weight	Nov. 24	5,206 Lbs.		
Weight end of 1st period	Dec. 15	5,324 "	118 Lbs.	
" 2nd "	Jan. 12	5,563 "	239 "	
" 3rd "	Feb. 9	5,757 "	194 "	
" 4th "	Mar. 9	5,934 "	177 "	
" 5th "	Apl. 6	6,156 "	222 "	950 Lbs.

Dehorned—Loose.	Date.	Weight.	Gain.	Total Gain.
Original weight	Nov. 24	5,240 Lbs.		
Weight end of 1st period	Dec. 15	5,534 "	294 Lbs.	
" 2nd "	Jan. 12	5,762 "	228 "	
" 3rd "	Feb. 9	5,914 "	152 "	
" 4th "	Mar. 9	6,004 "	90 "	
" 5th "	Apl. 6	6,204 "	200 "	964 Lbs.

Horned.	Date.	Weight.	Gain.	Total Gain.
Original weight	Nov. 24	5,222 Lbs.		
Weight end of 1st period	Dec. 15	5,489 "	267 Lbs.	
" 2nd "	Jan. 12	5,650 "	161 "	
" 3rd "	Feb. 9	5,800 "	150 "	
" 4th "	Mar. 9	5,938 "	138 "	
" 5th "	Apl. 6	6,190 "	252 "	968 Lbs.

Cost of Feeding Each Lot of Five Steers.

6,650 pounds of straw		
3,325 "	hay at $4.00 per ton	$ 6 65
13,300 "	ensilage at $2.00 per ton	13 30
5,495 "	chop at 68¾c per 100	37 78
		$57 73

Description of Fodder.

The hay was threshed Brome Grass.

The ensilage was made from early ripening corn.

The chop consisted of ½ oats, ¼ wheat screenings and ¼ barley.

Summary of Results.

—	First Cost of Steers.	Value of Feed Consumed.	Price Sold For.	Loss.
Dehorned, tied	$182 21	$57 73	$230 85	$9 09
" loose	183 40	57 73	232 65	8 48
Horned	182 77	57 73	232 12	8 38

SWINE.

The herd of swine on the farm continues in good health, and consists of the following animals :—

Name.	Breed.	Age.	Name.	Breed.	Age.
Royal Victor	Berkshire	2 years.	British Prince	Tamworth	13 months.
Minnie Merle 3rd	"	19 months.	6 sucking pigs	"	3 "
1 pig	"	8 "	Squire	Chester White	3 years.
3 sucking pigs	"	2 "	7 sucking pigs	Tamworth, Chester White	2 months.
Sergeant Major	Tamworth	20 "	Brandon Chief	Improved Yorkshire.	7 "
Amy's Choice 2nd	"	2 years.	1 sow	" "	7 "
Nina of Brandon	"	2 "			

SWINE FEEDING.

There is an increasing demand throughout the province for lean pork to replace the heavy fat meat generally supplied, and it was thought advisable to ascertain whether a more acceptable article could be obtained from using a boar of the so-called bacon breeds with Berkshire sows.

The dam used was a pure bred Tamworth, and the sire a very typical Berkshire. The ten pigs from this cross were healthy, vigorous animals, with deep and long sides and suitable for bacon purposes. Two of these and two of the pure bred Berkshires of the same age were fed for seven weeks with a mixture of ground grain composed of 50 per cent of oats, 25 per cent of barley, and 25 per cent of wheat screenings. All were confined in pens.

From the accompanying table it will be noticed that the meat from the cross breeds cost less to produce. The meat from these pigs was decidedly the best, being lean with only a few streaks of fat running through it, while the pure bred Berkshire meat was thick and very fat.

Pure Bred Berkshires—

	Dr.	Cr.
Cost of two pigs, 202 lbs., at 4¼c. per lb.	$8 58	
Cost of feed	2 92	
Sold 276 lbs. at 4¼c. per lb.		$11 73
Profit on two pigs	23	
	$11 73	$11 73

Cost per 100 lbs, $3.94.

Tamworth Berkshire Crosses—

	Dr.	Cr.
Cost of two pigs, 196 lbs., at 4¼c. per lb.	$8 33	
Cost of feed	3 41	
Sold 316 lbs at 4¼c. per lb.		$13 43
Profit on two pigs	1 69	
	$13 43	$13 43

Cost per 100 pounds, $2.84.

BROME GRASS PASTURE FOR PIGS.

Last year an effort was made to find out the value of Brome grass pasture for fattening pigs, but owing to unforeseen circumstances it was found impossible to finish the test. This year the test was more successful, and the results given below show that this kind of pasture is excellent for the purpose.

The animals selected were Chester White and Tamworth crosses, and were all from one litter. The feeding commenced when the pigs were two months old, and directly after weaning.

The pasture field was seeded to brome grass in August, 1898. The area was one acre, and it not only gave abundance of pasture for the four pigs, but about two tons of hay was saved in addition. The pigs were evidently very fond of the grass, and were found feeding on it at all times of the day.

For the first three months both lots were fed on a mixture of soaked ground grain, composed of half oats, quarter barley and quarter wheat screenings, and during the last three months on ground pease alone.

The penned animals were fed all the grain they would eat up clean, but the pastured pigs only received sufficient to keep them steadily gaining in flesh without making them independent of the pasture.

Cost of Grain Fed to Pigs in Pasture.

156 pounds of barley at ½ cent per pound....	$ 0 78
156 pounds of wheat screenings at ½ cent per pound......	0 78
312 pounds of oats at ¾ cents per pound...............	2 34
325 pounds of pease at 1 cent per pound..	3 25
	$ 7 15

Cost of Grain Fed to Pigs without Pasture.

231 pounds of barley at ½ cent per pound..	$ 1 15
231 pounds of wheat screenings at ½ cent per pound.. ..	1 15
462 pounds of oats at ¾ cent per pound..	3 46
425 pounds of pease at 1 cent per pound..	4 25
	$ 10 01

SUMMARY.

Pastured Pigs—	Dr.	Cr.
First cost of pigs, 117 pounds at 4½ cents......	$ 5 26	
Cost of feed........................	7 15	
Sold 510 pounds at 4½ cents......................		$ 22 95
Profit on four pigs......................	10 54	
	$ 22 95	$ 22 95

Without Pasture—	Dr.	Cr.
First cost of pigs, 115 pounds at 4½ cents......	$ 5 17	
Cost of feed........................	10 01	
Sold 481 pounds at 4½ cents....................		$ 21 64
Profit on pigs..	6 46	
	$ 21 64	$ 21 64

POULTRY.

The fowls have kept quite healthy and twenty-six chickens were raised during the year. The flock now consists of 13 White Plymouth Rocks, 21 Black Minorcas and 16 Light Brahmas. Some experiments in feeding were commenced this autumn but were not finished in time to be included in this report.

BEES.

The five colonies placed in the house cellar last fall, wintered without loss, but again we have had a poor year for bees. Owing to the very light rainfall very few wild flowers blossomed in the early part of the season, and the continued rains in late summer prevented the bees working to any extent on late flowers. The amount of surplus honey gathered averaged only about 5 pounds per hive, spring count. Four new swarms were hived during the summer.

FRUITS.

APPLES.

The trees of the Wild Siberian Crabs (*Pyrus baccata aurantiaca, Pyrus baccata lutea* and *Pyrus prunifolia*), made a magnificent showing of bloom during the past spring, and hopes were entertained that a large crop of fruit would be harvested. The frost on the evening of June 8, however, almost totally destroyed the young fruit and only very few specimens matured. The fruit of these varieties makes a capital preserve, and the trees themselves are invaluable as stocks for grafting.

The frost mentioned above, also destroyed the blossoms of the Transcendent Crab mentioned in last year's report, as the only survivor of a consignment of ten trees received in 1899 from the Central Experimental Farm, and no fruit was gathered this season.

CROSS-BRED APPLES.

With the object of producing hardy apples for the North-west, the Director, Dr. Wm. Saunders, has during the past five years made a number of crosses of hardy apples, such as Wealthy and Tetofsky, with two of the hardy Siberian Crabs, *Pyrus baccata* and *Pyrus prunifolia,* both of which are perfectly hardy here. The experiment was successful and a number of seedlings resulted. Some of these have already fruited at the Central Experimental Farm, Ottawa, and have produced some very good sized fruit, showing a wonderful improvement on the female parents. A number of these seedlings, together with root grafts were received at Brandon during 1898-99 for the purpose of testing their hardiness here, and the results up to the present have been very satisfactory. Following will be found a full analysis of the test at this farm up to the fall of 1900. It will be noted that a large proportion of the grafted roots received in 1899 did not make any start, which fact was attributable to the very dry weather experienced during the spring months. The seedlings of all the consignments did much better than the root grafts. An interesting and detailed account of the work of making these crosses will be found in the director's annual report for 1899, which will be forwarded on application.

Female Parent.	Male Parent.	Record No.	Date Received.	Number Received.	Number Alive. 1900	Number Vigorous. 1900	Seedling or Graft.	Remarks.
Pyrus baccata...	Talman's Sweet		1898	9	9	9	Seedlings	
" ...	Wealthy		1898	7	6	6	"	
" ...	Red Astrachan		1898	4	2	2	"	
" ...	Tetofsky		1898	12	12	12	"	
" ...	Pewaukee		1898	6	5	5	"	
" ...	Excelsior		1898	2	2	2	"	
" ...	Wealthy		1898	3	0	0	Graft on P. baccata...	Did not start.
" ...	Swayzie Pomme Grise		1898	7	5	5	Seedlings	
" ...	Yellow Transparent...		1898	2	1	1	"	
" ...	Martha		1898	3	3	3	"	
Pyrus prunifolia.	Pewaukee		1898	3	0	0	"	
Pyrus baccata...	McMahan White		1898	1	1	1	"	
" ..	Duchess		1898	1	0	0	"	Did not start.
" ...	Wealthy	118	1898	7	2	2	Grafted on P. baccata..	3 did not start.
" ...	Red Anis	165	1898	2	1	1	" "	
" ...	Hyslop	30	1898	1	1	1	" "	
" ...	Tetofsky (Charles)	46	1898	2	0	0	" "	Did not start.
" ...	Wealthy	125	1898	4	0	0	" "	"
" ...	Duchess	142	1898	3	0	0	" prunifolia	"
" ...	Tetofsky	45	1898	1	0	0	" baccata...	"
" ...	"	116	1898	3	1	1	" prunifolia	2 did not start.
" ...	Red Anis	164	1898	3	2	2	" baccata..	
" ...	Orange Crab	16	1898	3	1	0	" prunifolia	Killed back ½.
" ...	Hyslop "	12	1898	3	3	3	" baccata...	
" ...	Orange "	1	1898	3	0	0	" prunifolia	Did not start.
" ...	Wealthy	127	1898	5	1	1	" baccata...	4 did not start.
" ...	Tetofsky	53	1898	2	0	0	" "	Did not start.
" ...	Hyslop Crab	107	1898	2	0	0	" prunifolia	"
" ...	Red Anis	161	1898	4	2	2	" "	1 "
" ...	Transcendent Crab.	19	1898	3	1	0	" "	2 " 1 killed ½.
" ...	"	29	1898	4	1	1	" "	
" ...	Red Anis	162	1898	4	0	0	" baccata...	Did not start.
" ...	Tetofsky	64	1898	1	0	0	" "	"
" ...	Wealthy	122	1898	3	2	2	" "	1 "
" ...	Duchess	141	1898	2	1	1	" "	1 "
" ...	Tetofsky	79	1898	2	0	0	" "	1 "
" ...	Wealthy	132	1898	2	1	1	" "	1 "
" cross		105	1899	5	1	1	Grafted	
" "		142	1899	5	2	1	"	
" "		118	1899	5	0	0	"	
" ...	Ball's Winter Crab		1899	8	8	8	Seedlings	
" ...	Beautiful Arkad		1899	4	3	2	"	
" ...	Krimskoe		1899	10	8	8	"	

Variety.	Record No.	Date Received.	No. Received.	No. Alive 1900.	No. Vigorous. 1900.	Seedling or Grafted.	Remarks.
Pyrus baccata cross	64	1899	5	2	2	Grafted	
" "	79	1899	5	1	1	"	
" "	16	1899	3	1	1	"	
" Charles..	46	1899	5	1	1	"	
" cross	102	1899	4	1	0	"	Weak growth.
" "	112	1899	4	0	0	"	
" "	122	1899	4	1	1	"	
" "	164	1899	4	2	2	"	
" "	19	1899	4	0	0	"	
" "	30	1899	4	1	1	"	
" "	107	1899	5	3	3	"	
" "	117	1899	4	0	0	"	
" "	163	1899	5	3	2	"	One killed back $\frac{3}{4}$
" "	165	1899	3	0	0	"	
" "	161	1899	4	2	2	"	
" " ...	125	1899	5	3	3	"	
" "	127	1899	5	3	3	"	
" "	162	1899	5	2	2	"	
" "	53	1899	4	3	3	"	
" "	116	1899	2	1	1	"	
" "	132	1899	3	1	1	"	
" "	137	1899	2	0	0	"	

CROSS BRED APPLES PLANTED 1898.

——	No. planted.	No. alive, 1900.	Percentage.
Seedlings planted in 1898..........................	57	46	$80\frac{10}{19}$
Grafts	72	20	$27\frac{7}{9}$

——	No. started.	No. alive, 1900.	Percentage.
Counting out grafts that did not start..................	30	20	$66\frac{2}{3}$
Grafts on Pyrus baccata started..........................	18	14	$77\frac{7}{9}$
" " Prunifolia started..................	12	6	50

——	No. planted.	No. alive. 1900.	Percentage.
Seedlings planted in 1899..............................	22	19	$86\frac{4}{11}$
Grafts planted in 1899................................	114	34	$29\frac{47}{57}$

A careful perusal of the above tables will show decidedly gratifying results ; and it seems reasonable to hope that experiments conducted along these lines, will go a long way towards eventually solving the apple problem in the North-west.

STANDARD APPLES.

Reference is made on page 304 of the 1898 report for experimental farms to specimens of the Tonka and Wealthy apples growing on this farm. The four trees in question (two of each variety) were received from Mr. A. P. Stevenson, of Nelson, Man., in 1896, and were grafts from trees which had proven hardy at his establishment at Nelson, which is only 900 feet above sea level. All are alive at this date, and two trees (one of each variety) look especially vigorous ; and up to the present show no sign of injury. In all probability they will produce flowers next season.

CRAB APPLE SEEDLINGS.

Of fifty trees of Martha Crab seedlings, planted in the crab apple orchard in 1898, thirty-nine were alive and in good condition in the fall of 1900

TOP GRAFTS.

A few scions of Blush Calville and White Rubets, and a crab apple unnamed, were received during the summer of 1900, from His Grace the Archbishop of Rupert's Land, and were grafted on *Pyrus baccata*. Owing to the very strong winds experienced, several worked loose and failed to unite. Two scions of Blush Calville and one from the unidentified crab apple effected a junction, and were in good condition on the approach of winter. Both of these varieties have proven hardy and borne fruit in Winnipeg.

PLUMS.

Owing to injury by spring frosts, the plum crop was almost a total failure during the past season. The trees flowered heavily and the fruit set well, but was completely blackened by the frost of June 7. No native fruit was gathered, and the few fruits left undestroyed on the improved varieties were again frozen before ripening.

RASPBERRIES.

The raspberry crop was an entire failure during the past season, the fruit failing to set on account of the prolonged dry weather in the spring.

SAND CHERRIES *(Prunus pumila)*.

Owing to the unfavourable climatic conditions which prevailed during the past season, the selected Sand Cherries, mentioned in previous reports, did not produce fruit, but made a fair growth.

GOOSEBERRIES.

The nine varieties of gooseberries under test at this farm came through the winter in good condition, and produced a small crop of fruit.

SASKATOON *(Amelanchier alnifolia)*.

It is pleasing to record a fine crop of this useful native fruit during the past summer. The berries were large, free from disease, and of fine flavour.

CURRANTS.

The currant was the only one of the small fruits which gave satisfaction during the past season, and even this was not by any means up to the average standard. Following will be found arranged in tabular form the notes taken during the year on this crop :—

Variety.	Colour.	Date of ripening.	No. of trees.	Yield.		Total.
				1st picking.	2nd picking.	
				Lbs.	Lbs.	Lbs.
North Star	Red	July 3 to 19	6	11½	....	11½
Red Cherry	"	"	6	7½	1½	9
Raby Castle	"	"	4	7½	3½	11
Red Dutch	"	"	4	12½	1½	14
La Versailles	"	"	2	2½	½	3
No. 22 Seedling	"	"	4	11	....	11
Victoria	"	"	4	10½	5	15½
Fertile D'Angers	"	"	4	4	½	4½
Cherry	"	"	4	15½	3½	19
Prince Albert	"	"	2	2	2½	4½
Pomona	"	"	6	13	½	13½
Climax	Black	July 6 to 15	4	6	....	6
Ethel	"	"	4	9	....	9
Black Naples	"	"	4	1	....	1
Kerry	"	"	3	5	....	5
Lee's Prolific	"	"	4	5	....	5
Charmer	"	"	4	4	....	4
Beauty	"	"	4	16½	....	16½
Clipper	"	"	4	....	....	4
Winona	"	"	4	4	....	4
Perry	"	"	3	3	....	3
Stewart	"	"	4	3	....	3
Eclipse	"	"	3	2	....	2
Monarch	"	"	4	3½	....	3½
Standard	"	"	4	1½	....	1½
Eagle	"	"	4	3½	....	3½
White Dutch	White	"	4	10½	....	10½
White Grape	"	"	4	6	....	6

FOREST TREES AND SHRUBS.

The effects of the past unfavourable season were visible in this division, as well as in other branches of farm work. Though the well-established trees do not show bad results in a marked degree, seedlings, cuttings, and newly-transplanted specimens, were more or less adversely affected by the long-continued drought of the spring months. A much larger percentage of transplanted trees succumbed during the past year than has been recorded for some time, while the germination of seedlings, and the growth of cuttings, were almost failures ; not more than 10 per cent of the former, and less than 5 per cent of the latter, starting to grow. The avenue trees and large hedges, however, looked quite as well as usual, and though much damage from insect pests was reported in the immediate vicinity to trees of the same varieties of which these are composed, we are pleased to be able to report perfect immunity from this trouble. Taken altogether, the season was a very unfavourable one for this branch of work.

The following is a list of trees received during 1899, and which have stood one winter at this farm :—

Abies balsamea variegata (Variegated balsam spruce).
Ampelopsis Quinquefolia hirsuta (Self-fastening virginia creeper).
Berberis Neuberti (Neubert's barberry).
" *hybrid No. 2* (Hybrid barberry).
" *aquifolium murrayana.*
" *sibirica* (Siberian barberry).
" *japonica* (Japan barberry).
Betula pumila (Dwarf birch).
Cephalanthus occidentalis (Button bush).
Celastrus articulatus (Japanese bitter sweet).
Cratægus coccinea (Yellow fruited Hawthorn).
Cytisus nigricans longispicatus.
" *sessilifolius.*
Cornus sanguinea (Red dogwood).
Cotoneaster laxiflora.
Euonymus nanus obovasus.
Fraxinus longicuspis (Japan ash).
Genista tinctoria sibirica.
Juniperus chinensis = J. Japonica.
" *communis fastigiata var. suecica.*
" *communis fastigiata var. hibernica.*
" *sabina argentea.*
" *glauca.*
" *virginiana elegans.*
" " *pyramidalis* = *J. fragrans.*
" " *Schotti.*
" *communis aurea* (Golden Juniper).
Larix Europæa (European larch).
Laburnum Adami.
" *alpinum* (Alpine laburnum).
Lonicera Xylosteum (Upright Fly Honeysuckle).
" *sempervirens* (Scarlet Trumpet honeysuckle).
" *hirsuta* (Hairy honeysuckle).
Ostrya Virginica (American Hornbeam).
Picea excelsa aurea (Golden Norway spruce).
" " *pendula* (Pendulous Norway spruce).
" " *pyramidalis* (Pyramidal Norway spruce).
" *nigra* (Black spruce).
" *obovata Schrenkiana* (Schrenk's spruce).
Pinus strobus (White pine).
" *montana* (Mountain pine).
Pinus austriaca (Austrian pine).
" *mughus* (Dwarf mountain pine).
Pyrus rotundifolia (Round-leaved pyrus).
" *betulæfolia* (Birch-leaved pyrus).
" *aucuparia* (European mountain ash).
" *Maulei* (Maule's Japanese quince).
Prunus Maximowiczii.
" *maritima* (Beach plum).
" *tomentosa.*
" *demissa* (Western wild cherry).
" *pendula japonica* (Japan cherry).
Philadelphus Lewisii = *P. nivalis.*
" *Keteleerii.*
" *hybridus Lemoinei.*
" *hybridus Lemoinei Boule d'Argent.*
" *cordifolius.*
" *hirsutus.*
Periploca græca.
Photinia variabilis arguta.
Quercus rubra americana (Red American oak).
" *pyramidalis* (Pyramidal oak).
" *coccinea* (Scarlet oak).
" ? (Japanese oak).
Rhamnus crenata.
Rosa villosa pomifera.
" *agrestis.*
" *canina macrantha*
" *californica.*
" *lucida.*
" *lucida grandiflora.*
" *nutkana.*
" *rugosa.*
" *tomentosa* (Downy-leaved rose).
Rhus cotinus atropurpurea.
Ribes alpinum pumilum (Dwarf alpine currant).
Sambucus nigra virescens.
" *nigra semperflorens.*
Symphoricarpus Heyeri.
Syringa pekinensis (Pekin lilac).
" *alba grandiflora* (Large-flowered white lilac).
Spiræa bracteata.
Thuya occidentalis pyramidalis.
" " *Columbia.*
" " *Caucasica.*
" " *pigmaea.*

FOREST TREE SHELTER BELT.

The thinning out of deciduous trees, in places where they were crowding out the evergreens, is still being continued, and a considerable amount of work was done in this direction during the past season. The good effects of this was very visible in the more vigorous condition of the evergreens.

HEDGES.

Great interest is taken by visitors in the hedges, a long row of which is planted alongside the main avenue, and is, perhaps, one of the greatest attractions of the farm, as well as the subject of numerous inquiries. Everyone apparently recognizes the great importance of wind breaks in our open country. The large hedges surrounding the shelter blocks, composed of native maple *(Negundo aceroides)*, Sharp-Leaved Willow *(Salix acutifolia)*, Green Ash *(Fraxinus pennsylvanica lanceolata)*, American Elm *(Ulmus americana)*, Russian Poplar *(Populus berolinensis)*, and Cottonwood *(Populus deltoidea)*, continue to do well, with the following exceptions. The Cottonwood is killed to the ground by the rust previously noticed as attacking the leaves of this tree of late years. The Russian Poplar is showing signs of deterioration, principally by losing its lower branches, this tree evidently not standing close planting.

A portion of the Sharp-leaved Willow hedge, situated in a somewhat dry location, has also killed back considerably ; the balance, however, is in good condition. Of the other varieties listed above, the Native Maple seems best adapted to fulfil the requirements of a hedge plant, as in its native state it branches close to the ground, and does not readily kill out by crowding. Perhaps the most satisfactory hedge growing on this farm is one of the Native Spruce *(Picea alba)*, planted in 1893, on the hillside east of the superintendent's house. This is now an almost impenetrable hedge, ten feet high, and the fact of its being an evergreen increases its value, and makes it very attractive during the winter months. A hedge of *Acer Ginnala* (Asiatic Maple), planted in the same year, is generally regarded as one of the best dwarf ornamental hedges, and is much admired by visitors on account of its symmetry and the beauty of its foliage. The most serviceable deciduous hedge is the Siberian Pea Tree *(Caragana arborescens)*, also planted in 1893, on the hillside west of the superintendent's house. It is very dense, and is covered in the spring with beautiful laburnum-like flowers, and readily submits to pruning into any shape desired. It is also a rapid grower, can be easily propagated from seed, and is thoroughly hardy, rendering it invaluable as a hedge plant for the north-western country.

Experiments were commenced in 1895 with the view of testing the adaptibility of various trees and shrubs for this purpose, which has since been continued. The following list contains the result of this work to date, with notes thereon, each experimental hedge being 60 feet in length :—

Number.	Botanical Name.	Common Name.	When Planted.	Height 1900.	Width 1900.	Remarks.
				Ins.	Ins.	
1	Pyrus baccata aurantiaca	Wild Siberian Crab	1898	36	24	A somewhat thin hedge.
2	Lonicera tatarica splendens	Tartarian Honeys'kle	1898	33	27	A very ornamental hedge.
3	Caragana mollis glabra	Glabrous Pea Tree	1895	39	20	A fine medium hedge.
4	Artemesia abrotanum	English Old Man	1898	33	42	A fine dwarf hedge.
5	Shepherdia argentea	Buffalo Berry	1898	30	27	A promising hedge.
6	Rosa rugosa	Japan Rose	1898	30	30	Compact, but suckers badly.
7	Celtis occidentalis	Button Bush	1898	30	27	Not promising.
8	Ligustrum amurense	Amur Privet	1898	27	24	A very promising hedge.
9	Spiraea Douglasii	Douglas Spirea	1898	30	18	Very ornamental.
10	Syringa josikea	Josika's Lilac	1898	30	20	A good ornamental hedge.
11	Cratægus coccinea var. Sullivantii	Native Hawthorn	1897	27	16	Very small as yet.
12	Lonicera albertii	Albert's Honesuckle	1898	20	48	Needs trelissing.
13	Fraxinus pennsylvanica lanceolata	Green Ash	1898	45	18	Somewhat thin.
14	Prunus americana	Wild Plum	1897	33	21	Small as yet.
15	Acer Ginnala	Asiatic Maple	1897	36	24	Fine dwarf hedge.
16	Rhamnus frangula	Buckthorn	1897	36	30	Very promising.
17	Caragana grandiflora	Siberian Pea Tree	1898	33	20	A fine hedge.
18	Salix britzensis	Red Willow	1896	63	42	A good looking hedge.
19	Thuya occidentalis	Arbor Vitae	1899	16	18	Very small as yet.
20	Artemesia abrotanum tobolskianum	Siberian Old Man	1895	72	60	A quick growing windbreak.
21	Vacant					
22	Larix occidentalis	American Larch	1897	46	30	Very promising.
23	Salix laurifolia	French Laurel leaved Willow	1897	60	42	Not promising.
24	Salix voronesh	Voronesh Willow	1898	60	42	A good hedge.
25	Rosa rubrifolia	Red leaved Rose	1897	33	27	Suckers badly.
26	Caragana arborescens	Siberian Pea Tree		51	33	One of the best medium hedges.
27	Cotoneaster vulgaris	Common Cotoneaster	1897	33	33	Promising.
28	Lonicera tatarica elegans	Tartarian Honeys'kle	1897	44	30	Very ornamental.
29	Picea alba	Native White Spruce		30	24	Small as yet.
30	Salix laurifolia 'true'	Laurel leaved Willow	1897	60	42	A fine hedge.
31	Ribes aureum	Flowering Currant	1897	44	30	A dwarf compact hedge.
32	Negundo aceroides	Native Maple		55	44	A useful quick growing hedge.

Number.	Botanical Name.	Common Name.	When Planted.	Height 1900.	Width 1900.	Remarks.
				Ins.	Ins.	
33	Spiraea opulifolia aurea.....	Yellow Ninebark....	1895	30	30	A beautiful hedge, rather tender.
34	Spiraea opulifolia....... ...	Ninebark..........	1895	42	38	" " very hardy.
35	Populus tremuloides.	Native Aspen.	1895	42	27	Very promising.
36	Prunus pennsylvanica	Pin Cherry	1895	54	36	"
37	Corylus americana.........	Hazel Nut..........	1895	28	20	Too thin.
38	Amelanchier alnifolia	Saskatoon	1895	30	22	Not a first class hedge.
39	Rosa Sayi............... ..	Native Rose........	1895	40	30	Suckers badly.
40	Spiraea salicifolia...........	NativeMeadowSweet	1895	38	30	A most symetrical hedge.
41	Symphoricarpus occidentalis	Snowberry..........	1895	26	24	" "
42	Elaeagnus argentea..... ...	Wolf Willow.. ...	1895	32	22	A promising hedge.
43	Cornus stolonifera..........	Dog Wood..........	1895	48	42	" "
44	Syringa vulgaris............	Common Lilac......	1895	46	36	A compact and ornamental hedge.
45	Betula lenta...	Sweet Birch........	1899			These are not advanced enough to report upon ; No. 48 is dead.
46	Betula lutea.............	Yellow Birch.......				
47	Abies balsamea.....	Balsam Spruce....				
48	Viburnum lantana..........	Wayfaring tree				
49	Ptelea trifoliata......... ...	Hop tree				
50	Betula nigra..	Black Birch				
51	Hippophae rhamnoides......	Sea Buckthorn......				
52	Betula alba	White Birch...... ..				
53	Betula pumila..............	Dwarf Birch........				

NATIVE SPRUCE.

About the middle of May a trip was made to the swamp at Sewell, Manitoba, in order to procure specimens of our Native White Spruce (*Picea alba*). About 150 trees were lifted which were planted in one of the shelter blocks in order to become established, and despite the very adverse season very few succumbed. As many complaints are received in reference to the non-success of planters of this valuable tree, it may perhaps be well here to give a short description of the method of lifting and planting followed out at this farm. In the first place only small isolated trees should be selected and as much of the natural soil taken with them as possible. These should be immediately transferred to the wagon box (preferably a tight one), and covered so as to preclude the possibility of the drying out of the roots. The latter precaution is probably the most important of all, and we are of opinion that to the neglect of this may be attributed the great proportion of failures. The sap of the spruce being very resinous, should it once become dry very little hope may be entertained of success, and it is advisable to throw a few pails of water over the load at every stopping place on the return journey. After planting, a thorough watering is given, which is followed by constant cultivation, and if these simple instructions are adhered to success would follow the efforts to grow this much to be desired tree.

ARBORETUM.

Planting in the arboretum was continued during the past season, both in the extension made on the east side last summer as well as on the hillside to the north. The latter portion is devoted principally to Maple, Poplar and other rapid growing trees, the hardiness of which has been fully demonstrated here, in order to clothe the bare hillside as quickly as possible. Following is a list of the new varieties added during 1900 :—

Additions to Arboretum during 1900.

Populus balsamifera intermedia.
Scotch Yellow Rose.
Populus nigra (Black poplar).
Juniperus sabina erecta (Erect savin).
Picea excelsa (Norway spruce).
Lonicera tatarica grandiflora (Tartarian honeysuckle).
Amber currant.
Rosa acicularis (Siberian prickly rose).
Carpinus caroliniana (Blue Beech).
Fraxinus nigra (Black ash).
Japanese Oak.
Rosa alpina (Alpine rose).
Rhus aromatica (Aromatic sumach).
Rosa spinosissima (Burnet-leaved rose).
Thuya occidentalis Elwangeriana (Elwanger's Arbor vitae).
Ribes aureum tenuiflorum.
Rhamnus davurica.
Rosa cinnamomea sibirica (Siberian cinnamon rose).
Thuya occidentalis variegata (Variegated Arbor vitae).
Rhamnus cathartica (Common buckthorn).
Spiræa sorbifolia (Sorbus-leaved spiræe).
Ribes alpinum sterile (Sterile alpine currant).
Betula alba fastigiata (White birch).
Gymnocladus canadensis (Kentucky coffee tree).
Photinia variabilis.
Cotoneaster acutifolia.
Berberis vulgaris foliis purpureis (Purple barberry).
Acer saccharinum No. 1, from Minnesota seed (Sugar maple).
Acer saccharinum No. 2, from Minnesota seed (Sugar maple).
Cytisus nigricans.
Celastrus articulatus (Japanese Bittersweet).
Rhus glabra (Glabrous sumach).
Salix candida femina (White willow).

THE VEGETABLE GARDEN.

The past season was without doubt one of the most discouraging experienced during the history of the farm, the Horticultural Department suffering equally with the other branches of the farm work.

Spring opened with bright sunny weather, seeding commenced early and everything seemed to be full of promise, and to point to a very successful year. The snowfall of the preceding winter being light, the soil did not contain its usual quantity of moisture and speedily dried out under the continuous bright weather, which was not perceptibly broken until June 26, when the first rain of the season fell.

Owing to the long drought the germination of seed was uneven, a large portion of it lying dormant in the soil until the end of June, while here and there in moist patches, germination had previously taken place, rendering a uniform test practically impossible; a sharp frost on the evening of June 8 when the thermometer registered 25°, still further complicating matters in this respect.

Although abundance of rain occurred during the balance of the season, a number of early sown varieties of vegetables, such as onions, carrots, parsnips, &c., failed to attain maturity, showing that an early growing season is absolutely necessary to mature such products in this province, no amount of fine weather afterwards, compensating for this deficiency.

On the evening of August 17, by which time the crops had considerably improved, a severe hail storm occurred (the first recorded on the Experimental Farm), which caused great havoc in the vegetable garden, cutting down much of the green stuff, and making serious indentations in pumpkins, squash, tomatoes, &c., and doing much injury generally.

HOTBEDS.

During the fall of 1899 a small greenhouse was erected which has proved very useful for plant-raising. An excavation was made and the sash used were those belonging to the hotbeds. The heating was accomplished by means of a brick flue running from end to end of the building and terminating in a chimney outside. At present it is only used from the end of March until fall, and for this period very little fuel is needed. Such a building would be of much value to market gardeners, enabling them to put such produce as lettuce, radishes, &c., on the market at a time when they command good prices, besides giving them greater control over young seedlings, than can be obtained by the sole use of hotbeds.

The plan adopted at the Brandon farm is to sow in boxes in the greenhouse during March and April and transplant into other boxes as soon as the plants can be handled,

allowing them to stay in the greenhouse for a few days until established, when they are removed to cold frames outside and remain there until the time arrives for planting them in a permanent location. The advantage of the greenhouse is obvious—serving as a protection to tender seedlings during the most trying period, that is during germination, and a short time subsequent. It is then that the fungous disease, known as 'damping off,' is so prevalent and often causes much damage. At this time bad weather occasionally occurs, perhaps a fall of snow, making it impossible to even open a hotbed, and consequently such disease may pursue its ravages unchecked when only hotbeds are used. The greenhouse, with its ready means of egress and ingress, permits of proper attention being given to young plants at this critical period.

The cold frames are made in a similar manner to the hotbeds, with the exception that no care is taken to separate the straw from the manure, and only about half the depth of manure is used. They are made in sufficient time to allow the first sharp heat to escape by the time the plants are ready to be transferred to them. A few inches of soil is then put on the surface of the manure and the frame retains sufficient heat to keep out frost, without making any forced growth—and strong plants are the invariable result.

The first sowing was made on March 29, and concluded on April 20. The exceptionally dry and bright weather was specially favourable for this branch of the work, and a splendid lot of plants were ready for transplanting on May 30.

Owing to the unfavourable season, onions usually such an excellent crop, produced no bulbs whatever, while carrots, parsnips, beets and turnips germinated much too late to attain maturity, consequently the yield was small. Corn, cucumbers, squash, pumpkins, tomatoes and lettuce gave an average crop, and were looking as well as usual, until injured by hail in August from which they never recovered. Cabbage headed out well, but cauliflowers were late, very few heads being obtained before severe frost, while both peppers and egg plants ripened outside, a somewhat rare occurrence here.

ASPARAGUS, 1900.

Name of Variety.	When Planted.	Production Period.	Colour.	Flavour.	Vigour.
Conovers Colossal	1893	April 20 to June 30	Purple	Good	Fair.
Barr's Mammoth	1894	" 20 " " 30	"	"	Strong.
Columbia White	1894	" 20 " " 30	White	Tender	"

The above varieties have now been under test for a number of years, and have succeeded well. Every farmer should have a bed of this useful vegetable. It needs only once planting, and its earliness and delicacy makes it specially acceptable at a period when vegetables are scarce. Barr's Mammoth is the most prolific, though Columbia Mammoth White is considered by many to be of superior quality.

ARTICHOKES.

The Jerusalem artichoke (*Helianthus tuberosa*) has been tested at this farm for three years, and found to be wholly unsuitable for this country, not maturing before severe frost. This year a small quantity of the seed of the French artichoke was procured and sown in hotbed on April 5. The seed germinated well, plants were put into boxes on April 30, and planted in vegetable garden in June. The plants grew vigorously, and were in good condition before winter set in, and should they prove hardy, may be a valuable addition to the list of available vegetables here.

BEANS.

Twenty-six varieties of beans were sown in the open on May 21, in rows 30 inches apart, and were afterwards thinned to six inches apart in the row. Despite uneven germination, a sharp frost on the evening of June 8, and other climatic drawbacks of the season, a good average crop of pods was produced, though the delay in germination precluded the possibility of the seed ripening.

The germination of one variety (Taber's I. X. L.) was too poor to allow any comparison being made, and three others, Burpee's Bush Lima, Galega Refugee, and Broad Windsor, did not arrive at a fit condition for table use.

BEANS—1900.

Number.	Variety.	Date Ready for use.	Colour.	Shape.	Ratio of Productiveness.	Length of Pod.	No. of Beans in Pod.	Texture.
						In.	Beans.	
1	Roger's Lima wax	Aug. 13	Yellow	Flat straight	120	$3\frac{1}{2}$	4	Tender.
2	Canadian wonder	" 9	"	Long flat	80	7	5	Very tender.
3	Flageolet Scarlet wax	" 13	"	Flat straight	70	$6\frac{1}{2}$	5	"
4	New Everbearing	" 6	Green	"	68	5	4	Fairly tender.
5	Marvel of Paris	" 14	"	Long round	66	6	5	"
6	Yosemite Mammoth wax	" 12	Yellow	Long flat	64	6	5	Very tender.
7	Keeney's Rustless wax	" 12	"	Round straight	60	5	4	Tender.
8	Black Seeded wax	" 6	"	Round curved	56	$4\frac{1}{2}$	5	Very tender.
9	Golden wax	" 6	"	Curved round	53	$3\frac{1}{2}$	4	Tender.
10	Black-eyed wax	" 13	"	Straight flat	52	$4\frac{1}{2}$	5	Very tender.
11	Detroit wax	" 13	"	"	50	$3\frac{1}{2}$	4	Fairly tender.
12	Triumph of France	" 11	Green	Flat straight	50	5	6	Tender.
13	Early Dun Colored	" 6	"	Straight round	50	5	5	Fairly tender.
14	Early Mohawk	" 6	"	Straight flat	50	$6\frac{1}{2}$	4	Very tender.
15	White wax	" 11	"	"	48	5	6	"
16	Yosemite wax	" 11	Yellow	Curved round	45	6	4	Fairly tender.
17	Wardwell's Kidney wax	" 9	"	Flat straight	40	$5\frac{1}{2}$	5	Tender.
18	Giant Dwarf wax	" 10	Green	"	40	7	5	Very tender.
19	Dwarf Chocolate	" 10	"	"	40	6	5	Tender.
20	Dwarf Lyonais	" 15	"	Long straight	38	6	4	Fairly tender.
21	Ne Plus Ultra	" 6	"	Straight round	35	$5\frac{1}{2}$	6	"
22	Best of All	" 14	"	Straight flat	33	6	5	Tender.

The four following varieties proved the best, taking into consideration productiveness, texture and appearance for market.

Rogers Lima Wax.—Very similar in shape to the Lima beans, a beautiful light yellow colour, very dwarf and enormously productive.

Canadian Wonder.—This bean continues to merit its reputation as one of the best varieties for Manitoba. It is a deep yellow in colour, fairly early, very productive, with large handsome pods.

Scarlet Flageolet Wax.—This variety is an old favourite, and deservedly so. The pods are large, of a deep yellow colour and borne in profusion.

New Everlasting.—The most productive of the green varieties tested this season, the pods are short, flat, and are produced in abundance, continuing until frost.

BEETS.

Only two varieties of beets were tested this season, viz., Early Eclipse and Early Blood Turnip, both of which are turnip rooted varieties.

Variety.	Date Sown.	Date Pulled.	Colour.	Shape.	Yield.	
					Bush.	Lbs.
Early Blood	May 3	Oct. 10	Dark	Turnip	216	14
" Eclipse	" 3	" 10		"	198	17

Both were sown with a Planet Junior Hand drill in rows 30 inches apart, the unusually low yield may be attributed to the very late germination of the bulk of the crop. The table qualities of both were excellent.

BROCOLI.

The seed was sown in hot-bed on April 20, and planted outside on June 15. The heads, however, did not begin to form until late in the season, and were nipped by frost before attaining maturity.

CARROTS.

Two varieties of carrots were sown on May 3, viz., Danver's Half Long, and Half Long Chantenay. Late and uneven germination proved detrimental to this crop, and only a comparatively light yield was obtained.

Variety.	Date Pulled.	Type.	Texture.	Yield per Acre.	
				Bush.	Lbs.
Danver's Half Long	Oct. 5	½ Long	Tender	120	16
Half Long Chantenay	" 5	½ "	"	114	45

CABBAGE.

The cabbage crop was one of the least affected by the drawbacks of the season, and towards the close of the season some very good heads were obtained. The seed of four varieties was sown in hot-bed on April 20, and transplanted to the open on June 15. On account of the general scarcity of green stuff, gophers destroyed this planting, and a second planting was necessary. This was made on June 25, and on October 5, the crop was stored in root cellar.

Variety.	Date Pulled.	Shape.	Average Weight.	Percentage Headed Out.
Early Jersey Wakefield	Oct 3	Pointed	8 pounds	76
The Lupton	" 3	Flat	10 "	86
Late Flat Dutch	" 3	"	10 "	88
Red Drumhead	" 3	Rounded	6 "	50

The variety Late Flat Dutch does not compare favourably with Marblehead Mammoth as a standard late variety.

CAULIFLOWER.

Two varieties were sown on April 20, in hotbeds, viz., Early Snowball and Large Early Erfurt, and only very few heads were obtained from the former before frost, while the latter failed to bring any to a condition fit for table.

CELERY.

Four varieties of celery were sown in boxes in hotbed on March 29, viz., White Plume, Pink Plume, Giant Pascal and London Prize Red. The germination was good in all cases but one, viz., London Prize Red, which was evidently very poor seed. Exceptionally fine plants resulted, but on account of the very dry weather at planting time, and our very inadequate water supply, it was deemed unadvisable to put out the plants.

CHICORY.

One variety (Large Rooted Magdeburg) was sown on May 3, and produced magnificent roots. This is the second test of this vegetable here, and on both occasions the yield and quality have been exceptional.

CORN.

This vegetable produced a good crop, despite the drawbacks of the year. Four varieties, viz., Early Cory, First-of-all, Mitchell's Extra Early and Squaw Improved, were sown with the Planet Junior Hill drill, in rows 4 feet apart and 2 feet apart in the row, on May 21. Though a portion of the seed came up immediately, germination was not complete until after the June rains, but even the later part of the crop came to a condition fit for table use, and in some cases ripened. The bulk of Mitchell's Extra Early and Squaw, and about 20 per cent of Cory and First-of-all produced ripe seed.

Variety.	Sown.	Ready for Use.	Type.	Length of Head.	Weight Per Dozen.	Flavour.
				In.	Lbs.	
Early Cory	May 21	Aug. 15	8 row, swe't	6	4	Good.
First of All	" 21	" 15	10 "	$6\frac{1}{2}$	$3\frac{1}{2}$	"
Mitchell's Extra Early	" 21	" 10	8 " flint	6	$3\frac{1}{4}$	Fair.
Squaw Corn	" 31	" 10	8 " "	7	4	"

CUCUMBERS.

The cucumber crop was, on the whole, a very fair one, and had it not been for the hail storm in August would have been fully up to the usual standard. Fortunately, however, a fair quantity of fruit had been gathered previous to this. The forcing variety (Carter's Model) grown in the greenhouse produced some very fine early fruit.

Variety.	Where Sown	Date Sown.	Date Ready.	Shape.	Average Length.	Average Weight.	Productiveness.
					In.	Ozs.	
White Spine	Outside.	May 21	Aug. 26	Symmetrical, spiny	8	10	Fair.
White Wonder	"	" 21	" 26	" "	8	10	Very good.
Paris Pickling	"	" 21	" 12	Spiny, twisted	10	11	"
Giant Pera	"	" 21	" 20	Smooth, straight	12	12	Fair.
Carter's Model	Greenhouse.	Apr. 2	July 20	" long	18	16	Very good.

All the ridge varieties were sown in hills, three feet apart, the rows being four feet apart.

EGG PLANT.

One variety of this vegetable (Early Long Purple) was sown in hotbed on April 3, and transplanted to the open ground on June 15. The plants grew dwarf and stocky and produced fruit, which was ready for the table on August 5, of excellent flavour.

LETTUCE.

Two varieties of lettuce were sown outside on April 6, but on account of late germination did not arrive at a condition fit for table use until the latter part of July. In the greenhouse, lettuce sown on March 29 was ready for use in May—the product being very tender and palatable. Toronto Gem was the variety used. Hanson and Paris Cos were sown outside.

LEEKS.

The variety know as London Flag was tested, but the yield was small.

ONIONS (SEED.)

The seed onion crop was a failure this season, none of the varieties tested producing bulbs. Late germination was responsible for this, as, to succeed with onions, early sowing and early germination are indispensable.

ONIONS (SETS).

The onion sets produced an average crop despite the drawbacks of the season. Two varieties were planted on May 3, viz., Shallots and Yellow Dutch Sets.

Variety.	Date Ripened.	Colour.	Shape.	Yield per Acre.	
				Bush.	Lbs.
Dutch Sets	Oct. 5	Yellow	Globular	463	16
Shallots	Sept. 20	Brown	Clusters	140	19

PARSNIPS.

One variety of the above (Hollow Crown) was sown on April 16, but owing to late germination the yield was small.

PARSLEY.

As usual this vegetable was entirely satisfactory. The variety grown was Extra Curled, the seed was sown in the open on May 3.

PUMPKINS.

Two varieties of pumpkins were grown during the past season, viz., Connecticut Field and Sweet or Sugar.

Both were sown in the open on May 21, and produced a good crop of ripe fruit.

Variety.	Date Ripe.	Colour of Flesh.	Average Weight.	Flavour.	Productiveness.
			Lbs.		
Sweet or Sugar..................	Aug. 15..	Yellow...	7	Very good	Very pr'd.
Connecticut Field........	" 10..	" ...	20	Fair......	"

The variety, Sweet or Sugar, was by far the best for pie purposes--Connecticut Field being evidently a stock-feeding variety.

POTATOES (TEST OF VARIOUS CUTTINGS).

The test as to the value of different cuts for seed purposes of the potato was continued this season with the following results—the variety chosen for the test was Crown Jewel :—

Size of Cut.	Percentage of Germination.	Quality of Product.	Weight Planted.	Weight of Large.	Weight of Small.	Total Weight.
			Ozs.	Lbs.	Lbs.	Lbs.
Seed Ends....................	95	Fairly regular	¾	5	½	5½
One Eye....................	65	Very irregular	1¾	3¼	½	3¾
Two Eyes..................	80	" regular..	3¾	7½	....	7½
Three Eyes.................	90	" " ..	6	5½	½	6
Four Eyes.....................	100	Fairly regular	8	6¼	1¼	7½
Whole potatoes.............	100	Very irregular	12	6¾	4¼	11

Considering the dry condition of the soil at planting time, the germination of potatoes was very good. In the above test the Two-eyes gave the best average return, the yield being high and the product remarkably regular. Seeds ends again were very satisfactory, while the whole set, though giving the largest returns, were very irregular.

PEPPER.

One variety of pepper, 'Black Nubian,' was sown in hotbed on April 3 and transplanted to the open June 15. A fair crop was gathered on August 10, the colour of the fruit being a dark purple and very attractive.

RHUBARB.

There are now represented nineteen varieties under test, which were, last year, divided on account of overcrowding in the old bed, and a fresh plantation was made. More space has been given the plants in the new bed, which will permit visitors to examine the characteristics of the different varieties more conveniently than before.

Variety.	*Growth.*
Victoria..	Vigorous.
Tottle's Improved	Very strong.
Strawberry..	Vigorous.
Royal Albert	Very vigorous.
Giant..	Fairly vigorous.
Marshall's Linnæus	Vigorous.
General Taylor	Rather weak.
Scarlet Nonpareil	Very vigorous.
Early Crimson	"
Brabant's Colossal	"

Variety.	*Growth.*
Magnum Bonum	Very vigorous.
Prince Albert	"
Paragon	Weak.
Toblesk	Vigorous.
Samyster's Prince	"
Early Prince	"
Early Scarlet	"
Excelsior	Planted fall, 1900.
Queen	" "

SQUASH.

Only two varieties of squash were sown the past season, viz., Long White Bush Marrow and English Vegetable Marrow. Both did extremely well and a very good crop was obtained, although the fruit was somewhat damaged by hail on August 17.

Variety.	Date Sown.	Date Ready.	Average Weight.	Color.	Shape.	Productiveness.
Long White Bush Marrow....	May 21.	Aug. 10.	12 lbs.	Creamy White	Long...	Very productive.
English Vegetable " ...	" 21.	" 12.	8 "	"	" ...	"

SWEET HERBS.

Sage, Summer Savory and Thyme were grown this season with the usual success, and the product was dried and stored for winter use.

EXPERIMENTS WITH FIELD BEANS.

Four varieties of these were sown in rows two feet apart, in plots of one-twentieth acre. The soil was a clay loam, which had been summer-fallowed. All were sown on May 28, but did not germinate until July and only an occasional bean ripened, and for that reason no returns of yields are available.

THE FLOWER GARDEN.

The flower garden was very successful during the past season. Though the prospect was not promising at planting time on account of the drought, the water supply was sufficient to carry the beds through the critical period ; and the generous rains during the remainder of the season caused a luxuriant growth, and a profusion of flowers, which were much admired by visitors. In annuals, Phlox, Verbenas, Antirrhinum, Stocks and Salpiglossis, were especially noted for their brilliancy of colouring, while the Petunias, particularly the single varieties, were the finest we have ever grown at the farm, some of the flowers attaining a diameter of nearly six inches, with beautifully fringed edges and varied colours.

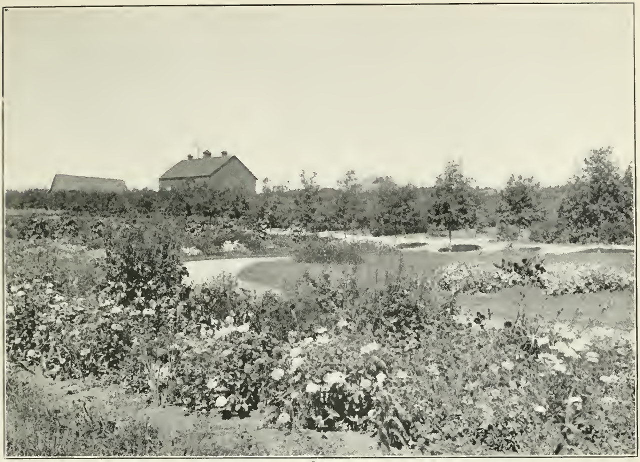
A very satisfactory little plant is *Brachycome iberidifolia* (Swan River Daisy). It is very suitable for edging, being dwarf ; it blooms very freely and is easy of cultivation. The Asters were this season almost entirely free from disease, and all types of this beautiful annual flowered well Following will be found a list of annuals grown, together with date of sowing and flowering period :—

Variety.	Date and Manner of Sowing.	Flowering Period.
Aster—		
Pæony Flowered Globe	Hotbeds, April 2	July 25 to frost.
Pyramidal Flowered German	" 2	" 25 "
Globe Flowered German	" 2	" 25 "
Quilled German	" 2	" 25 "
Betteridge's Prize	" 2	" 25 "
Imbricated Pompon	" 2	" 25 "
Truffaut's Pæony Flowered Perfection	" 2	" 25 "
Antirrhinum Majus	" 2	" 8 "
Majus Nanum	" 2	" 8 "
Brachycome Iberidifolia	" 2	June 10 "
Centaurea Imperialis	" 2	" 25 "
Chysanthemum—		
Coronarium Albo, fl. pl.	" 2	July 1 "
Fairy Queen	" 2	" 1 "
Carinatum Hybridum Fimbriatum, fl. pl.	" 2	" 1 "
Atrococcineum	" 2	" 1 "
Gaillardia Picta	" 2	" 5 "
Picta Lorenziana	" 2	" 5 "
Helichrysum Monstrosum	" 2	" 10 "
Lobelia, Crystal Palace Compacta	" Mars 29	June 25 "
Petunias—		
Hybrida Grandiflora Fimbriata	" April 2	July 12 "
" Nana Compacta	" 2	" 12 "
" " fl. pl.	" 2	" 12 "
" Grandiflora Superbissima	" 2	" 12 "
Pansies (five types)	" 2	June 20 to snow.
Phlox—		
Drummondi Grandiflora	" 2	" 20 to frost.
" " Nana Compacta	" 2	" 20 "
Rhodanthe Astrosanguineum	" 2	Did not transplant well.
Salpiglossis—		
Variabilis Nana	" 2	June 20 to frost.
" Grandiflora	" 2	" 20 "
" Superbissima	" 2	" 20 "
Stocks—		
Dwarf German	" 5	July 1 "
Large Flowered Ten Weeks	" 5	" 1 "
" " Pyramidal	" 5	" 1 "
Dwarf Bouquet	" 5	" 1 "
Tagetes Patula Nana	" 5	June 10 "
Verbena Hybrida	" 2	July 1 "
Hybrida Auriculæ Flora	" 2	" 1 "
Zinnia Elegans	" 5	" 1 "
Elegans Pumila	" 5	" 1 "
Calliopsis (Mixed varieties)	Outside, May 10	June 20 "
Mignonette "	" " 1	" 20 "
Portulaca "	" " 20	July 30 "
Sweet Pease "	" April 20	" 1 "

The work of transplanting commenced on April 11, and was completed on April 30. Some seed of Zinnias and Verbenas saved from plants grown on the farm the previous year, was sown for comparison with imported seed. The germination in both cases was in favour of the home-grown seed, while the resulting flowers showed no deterioration from their originals.

HERBACEOUS PERENNIALS.

This useful class of plants continues to attract the attention of visitors, and numerous applications for plants and seeds are received at the farm, showing that the farmers of Manitoba are fast recognizing the value of these permanent flowers as a means of home adornment easily within their reach. In last year's report, a list of some of the best varieties which have been fully tested here was given, to which the following may be added :—



Brandon, Man. Tree planting and flower bed near Superintendent's house.

Pæonias in bloom near house of Superintendent of Experimental Farm, Brandon, Man.

Lilium tigrinum.—The well-known tiger lily. This plant stands the winter well without any protection, and made a fine show of flowers during August.

Polemonium reptans (Jacob's Ladder).—A very vigorous, free blooming perennial. It is very hardy, and both foliage and flowers are handsome. They can be procured in two colours, blue and white. May be grown easily from seed.

Baptisia australis (False Indigo).—A pretty pea-shaped flower, and well worthy of a place in the perennial border. Propagated from seed.

Gypsophila paniculata (Angel's Breath).—The flowers of this plant are very useful for boquets, the gracefulness and delicacy of its sprays of minute white flowers rendering it a good variety for this purpose. Easily propagated from seed.

Rudbeckia Laciniata (Golden Glow).—A splendid plant for the background of borders. It grows to a height of five feet, and is literally covered with double yellow blossoms on long stems, which make them valuable for cutting. Propagated by division of the root.

Hesperis matronalis (Sweet Rocket).—An old favourite. Flowers very early, and profusely, and can be easily grown from seed.

Veronica salurgoides.—Though not a showy plant, this pretty veronica is worthy of a place in the garden. Propagated from seed.

Dahlias.—The following dahlias were received from the Central Experimental Farm on May 21, 1900, and were planted in flower garden a few days afterwards :—

Constance.	Nemesis.
Marguerite.	Bishop of Durham.
Wm. Plant.	Snowclad.
Fairy Queen.	Liliputian.
Wm. Agnew.	Mrs. Langtry.
Clifford W. Bruton.	John Sladden.
Mantas la villa.	Perfect Vallon.
Cactus Queen.	Victory.
Hector.	Susan Ingham.
Lyndhurst.	Herbert Turner.
Woman in White.	Crimson Beauty.
Wm. Dodds.	Cochineal.
Little Pigmy.	Chairman.
Hubert.	Gem.
Bird of Passage.	Lady Antrobus.

Of the above, four failed to make any growth, viz., Wm. Plant, Fairy Queen, Wm. Dodds and Susan Ingham. The remainder grew vigorously, and all produced flowers, some of which were very fine. They were lifted on October 15, and stored in the superintendent's house cellar.

Propagation of Dahlias.—Some twenty varieties of Dahlias which have been grown on the farm in previous years, were taken from the cellar last April, and placed underneath the stage in the green-house. Growth was soon commenced, and as soon as the shoots were long enough, cuttings were made of them and planted in boxes of sand, 95 per cent of which struck. On June 1, the rooted cuttings were planted outside, made strong plants, and flowered before frost. On lifting some fair-sized tubers were disclosed.

Roses.—The four roses mentioned in previous reports, viz., Baron Prevost, Madame Plantier, Gem of the Prairies, and Stevenson's rose (unidentified), are still alive. Last winter they were cut back more severely than usual, and Stevenson's rose was the only variety which produced flowers. Of the thirteen varieties mentioned in page 330 of last year's report (portion of a consignment received on May 2, 1899) as being alive in the fall of 1899, only one, viz., Docteur Arnal, survived the winter. This made some fine growth during the past season, but did not flower.

Gladioli.—A number of Gladioli bulbs were received from the Central Experimental Farm in May, part of which were started in hotbeds, the balance being planted in the open. Those started in hotbed were transferred to the open June 1, and at that time were well advanced. The frost on the evening of the 7th, however, gave them a check from which they did not fully recover, and only a few of them flowered. The bulbs which were planted in the open made fine growth, and about 50 per cent of them produced fine spikes. All were lifted on October 15, and stored in a cellar.

Delphinium condoretum Lemoinei.—A package of seed of this new Hybrid Perennial Larkspur was received from Central Experimental Farm on April 16 and sown in hotbeds on that date. The germination was good, and some nice sturdy plants were transferred to the open on June 20. Many of these flowered and showed two or three distinct shades of blue. The habit of growth and foliage is similar to that of *Delphinium Cashmerianum*, but the foliage is more glossy.

Tulips.—A consignment of tulip bulbs, received from the Central Experimental Farm in the fall of 1899, was planted in the flower garden, in beds occupied during the summer by annuals. Nearly all started, and made a fine display of colour during the spring months, which was greatly appreciated at a time when flowers are extremely scarce. As soon as the tulips were over, annuals were planted between the rows, care being taken to avoid injuring the bulbs, and thus an almost constant succession of flowers was kept up during the entire season.

Narcissus poeticus (*Poet's Narcissus*).—A bed of this beautiful Narcissus was planted in the fall of 1899. A very heavy covering of manure was placed on the surface of the bed, which was removed as early as practicable in the spring. The result appeared to indicate that the covering had been overdone—for the only bulbs that survived were those around the edge of the bed, where the covering of manure was not very deep. These flowered freely, and it seems possible that when the right amount of covering has been determined, we may be able to grow this very desirable spring flower with success.

ADDITIONS TO HERBACEOUS PERENNIALS, 1900.

One hundred and eighty-four varieties of perennial flowers were received from the Central Experimental Farm the past spring, and were planted in beds where they would have some shelter until established. Many of them flowered during the summer and it is hoped that many varieties in this large and interesting collection will prove hardy here.

DISTRIBUTION OF SEED GRAIN, POTATOES, &c.

Owing to the supply being somewhat limited, a less quantity than usual of grain was sent out, but a larger quantity than usual of maple and rhubarb seed has been distributed.

The following quantities were sent out to applicants :—

Wheat, 2 bushels or more	21
Oats " "	40
Barley " "	11
Grain of all kinds in 3-pound bags	459
Seeding trees, packages	310
Shrubs, packages	215

Distribution of potatoes, &c. :—

Potatoes in 3-pound bags	97
Maple seed, in 1-pound bags	240
Rhubarb seed, packages	129
Flower seed, packages	152

BOX ELDER OR MANITOBA MAPLE SEEDS.

The following reports have been received from parties to whom Manitoba Maple Seeds were sent in 1-pound packages, during the spring of 1899 :—

No. of applicants supplied	169
No. of reports received	65

	Successes.	Failures.
Seeds sown on summerfallow	10	3
" spring ploughing	17	2
" fall ploughing	15	3
" breaking	11	2
" garden (digged with spade)	2	..
Largest number of plants raised from 1-pound packet	4,000	
Maximum height of seedlings at end of season	2½ feet.	

REPORTS ON DISTRIBUTION OF COLLECTIONS OF TREES, SPRING 1899.

Only ten per cent of the parties supplied with trees reported on them. These all report having received the packages in good condition.

The small proportion of Cottonwoods to strike is noticeable; they do not appear to stand mailing as well as either Russian Poplars or Willows.

No. of applicants supplied	331
No. of reports received	30

All of which report that the cuttings were received in good condition.

Average per cent of cuttings struck—

	Per cent.
Russian Poplars	50
Cottonwoods	10
Willows	70

Maximum growth, summer 1899—

	Feet.
Russian Poplar	4
Cottonwood	3½
Willows	3

FRUIT TREE REPORTS.

During the spring of 1899 seedlings of Siberian Crab, Native Plum and Sand Cherries were distributed from this farm :—

No. of applicants supplied	65
No. of reports received	55

Condition in which the trees were received—

Good	51
Fair	4
Bad	0

Average per cent of trees living, summer 1899—

	Per cent.
Crab apples	60
Plums	90
Sand cherries	90

Maximum growth, summer 1899—

	Feet.
Crab apples	2
Plums	4
Cherries	4

SAMPLES OF GRAIN FOR EXHIBITION PURPOSES.

Twenty-two boxes of samples were forwarded from this farm to the Paris Exposition last year, containing good samples of as large a supply of agricultural products as could be furnished. A similar exhibit but on a smaller scale has been prepared during the past season for the exhibition to be held at Glasgow next year. A large display was made at the Brandon Fair in August of this year ; two boxes of threshed grain and sheaves have also been shipped to Canadian immigration agents in Scotland.

GRASSHOPPERS.

These injurious insects made their appearance in several places south-east of Brandon during the past season, and at the request of the resident farmers, I visited some of the affected sections for the purpose of ascertaining the extent of their ravages. Fortunately the districts affected were limited in their area, as compared with the province, otherwise the injury would have been very serious.

ROADS.

During the year fifty-two rods of new road has been constructed, leading from the farm buildings to the uplands. In addition to this all the roads on the farm have received a fresh coat of gravel, bringing them into first class condition.

PASTURE FIELD.

The sixty-five acre pasture field fenced in during 1899 has proven very useful. Fortunately three excellent live springs have been found within its boundary and they have proved particularly serviceable during the severe drought of early summer. Fifteen acres of this pasture field which had been under cultivation for a number of years was seeded to Brome grass in April of this year, this furnished fresh pasture in the fall when the native grasses were dried up.

NEW BREAKING.

During the season 22 acres of new land has been broken and backset. A portion of this is in a pasture field and will be reseeded in the spring with Brome grass.

FARMERS' MEETINGS.

Owing to illness last winter I as unable to attend as many meetings as usual. On February 1, I had the pleasure of attending, in company with Mr. F. T. Shutt, a large and interesting meeting at Portage la Prairie.

Meetings were also attended at the following places :—

Portage la Prairie, June 27, 1900.
Oak Lake, November 12, 1900.
Minnedosa, November 16, 1900.
Belmont, November 19, 1900.
Glenboro', November 21, 1900.
Hartney, November 23, 1900.
Virden, November 13, 1900.
Gladstone, November 16, 1900.
Wawanesa, November 20, 1900.
Melita, November 22, 1900.
Rapid City, August 11, 1900.

METEOROLOGICAL RECORD.

Month.	Highest Temperature.		Lowest Temperature.		Total Rain-fall.	Total Snow-fall.	Total Amount of Sunshine.
1899.	On	°	On	°	In.	In.	Hours.
December	6	39·9	30	—24·5	....	3	$108\frac{1}{10}$
1900.							
January	6	43·6	31	—32·6	....	$4\frac{3}{4}$	$99\frac{7}{10}$
February	22	34·6	9	—40·6	....	$5\frac{3}{4}$	$140\frac{4}{10}$
March	31	47·3	4	—23·3	....	3	$148\frac{6}{10}$
April	23	79·6	15	14·7	$\frac{33}{100}$	....	$264\frac{5}{10}$
May	12	99·3	2	17·6	$\frac{14}{100}$	....	$261\frac{3}{10}$
June	23	106·3	8	25·6	$1\frac{19}{100}$	....	$296\frac{1}{10}$
July	26	86·3	19	36·0	5	....	$284\frac{7}{10}$
August	2	93·2	28	32·6	$5\frac{89}{100}$	....	$197\frac{2}{10}$
September	20	79·4	17	26·4	5	....	$160\frac{3}{10}$
October	19	72·6	16	22·4	$\frac{32}{100}$	....	$127\frac{5}{10}$
November	4	48·3	24	25·0	....	....	$76\frac{7}{10}$
					$17\frac{87}{100}$	$16\frac{1}{2}$	$2,165\frac{1}{10}$

CORRESPONDENCE.

This year 4,252 letters were received and 3,076 despatched, irrespective of 2,927 circulars sent out.

I have the honour to be, sir,
Your obedient servant,

S. A. BEDFORD,
Superintendent.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

REPORT OF ANGUS MACKAY, SUPERINTENDENT.

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.,
November 30, 1900.

To Dr. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the thirteenth annual report of the operations on the Experimental Farm for the North-west Territories, at Indian Head, Assiniboia, during the year 1900.

The past season has been one of the most exceptional on record and, also, one of the most unsatisfactory to the settlers depending on grain. The winter of 1899 and 1900 was everything that could be desired, and from the time spring opened till seeding was completed the weather could not have been finer. On May 8, however, dry, windy weather set in and continued till July 4. During this time winds were almost continuous and the heat was excessive. On June 21, 22 and 23 the thermometer registered 101·5, 106 and 103 degrees Fahr., respectively, and in Assiniboia immense injury was sustained by the crops already weakened by protracted drought. During June a few local showers fell, but on account of the heated condition of the ground and atmosphere, were of little value, except in some instances where they kept the crops from drying up entirely. On July 4, 5 and 6 heavy rains set in and somewhat revived the grain-growing on fallow-land, but the crops on stubble were past saving.

In Saskatchewan and Alberta, June rains were abundant and crops of all kinds made excellent progress, giving promise of an exceptionally large yield. In the majority of cases this promise was fulfilled, but on account of heavy rain and snow-storms during harvest, the securing of the crop was an expensive and laborious task.

In Assiniboia, the harvest commenced during the first week of August, the earliest on record, but it was accompanied by heavy rains which caused delay in cutting and in consequence many fields were over-ripe before they could be reached by the binder. The rains continued during August and the early part of September and many cases of grain-growing in the stooks were reported.

Stock, in every part of the Territories, has never done better than during the past season, and although the prices for export beef have fallen considerably, ranchers and farmers are well satisfied with the year's work. This industry is growing very rapidly in Alberta and Saskatchewan and a few parts of Assiniboia. During the summer a representative meeting of stockmen was held at Calgary, Alberta and the 'North-west Cattle-breeders Association' and the 'North-west Horse-breeders Association' were organized.

EXPERIMENTAL FARM CROPS.

On the experimental farm the crops suffered very severely from winds and dry weather, and I regret having a very unsatisfactory report to offer of the result of the season's operations.

Nearly two-thirds of all our oats and pease and all the barley plots were killed by winds and had to to be resown, in consequence of which, many of the plots had not matured when frost came and were only fit for fodder. The crop, however, was a heavy one and having a considerable quantity of partially matured grain in it, the loss is not serious, except from an experimental point of view, as the returns cannot be given.

The hay crop (Brome, Native and Western Rye-grass) was a complete failure.

Potatoes and corn were the best ever grown on the farm ; turnips and mangels were a fair crop and carrots a complete failure.

Trees and shrubs made little progress until the rains came in July, when they made a fresh start, but the season was too short and only about one-half the usual growth was made.

Small fruits promised an abundant crop until June 21, when the excessive heat of that and the two succeeding days cooked almost the entire crop.

The Siberian Crab (*Pyrus baccata*), as well as the Seedling Native and improved varieties of plums produced a very satisfactory crop of fruit.

EXPERIMENTS WITH SPRING WHEAT.

Forty-nine varieties were tested on one-twentieth acre plots ; seven of the same varieties on plots ranging from one-half to ten acres, and Red Fife was used in test of fertilizers, rotation test, and test of blue-stone, as a preventive of smut.

The test of early, medium, and late seeding, sowing seed at different depths, sowing different quantities of seed per acre, and of hoe versus press-drill, were discontinued, as it was considered that during the previous eight years, sufficient reliable data had been secured to settle the points under observation without further trials.

TEST OF VARIETIES IN UNIFORM PLOTS.

Forty-nine varieties were sown on April 30, by hoe-drill, at the rate of 1½ bushels per acre, on one-twentieth acre plots of clay-loam, summer-fallowed in 1899.

All the varieties germinated well, and were from 2 to 4 inches high when winds and hot, dry weather set in and damaged many of the sorts to such an extent that it was deemed advisable to re-seed the injured plots with barley, which was done on June 13. Those left were very thin, and owing to the rains in August, causing a late, rank growth, the greater number of the plots were caught by frost on September 13.

The varieties were all sown in one row of plots across a 20-acre field, and those that withstood the winds and dry weather were well scattered over the whole row, clearly demonstrating that some varieties are much more susceptible to winds and drought than others sown and growing under similar conditions. The results given cannot, however, be regarded as of any value in indicating the relative productiveness of the different sorts under trial.

Wheat—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per acre.		Weight per Bushel.	Remarks.
				In.		In.		Lbs.	Bus.	Lbs.	Lbs	
1	Red Fife..........	Sept. 4..	144	31	Strong....	3	Bald...	2,200	30	20	62	Good sample.
2	Stanley	" 4..	144	34	"	3½	" ..	2,000	28	40	61	"
3	Dion's............	" 1..	141	41	"	4¼	Bearded	2,360	25	40	57½	"
4	Beaudry...........	" 12..	152	41	"	3½	" ..	2,240	25	..	60	Frozen.
5	Huron	" 8..	148	39	"	3½	" ..	1,500	20	40	60	Good sample.
6	Pringle's Champl'in	" 17..	157	36	"	4	" ..	3,360	20	40	....	Frozen.
7	Dufferin......	" 3..	143	42	"	4	" ..	2,400	20	..	60	Good sample.
8	Goose.............	" 4..	141	38	"	3	" ..	2,800	20	..	61	"
9	Hungarian	" 4..	144	30	Medium..	3	" .	1,860	19	..	60½	"
10	Alpha	" 17..	157	54	Strong....	4½	" ..	2,000	19	..	....	Badly frozen.
11	Colorado..	" 12..	152	41	Medium.	4½	" ..	2,000	18	20	56	"
12	Blenheim..........	" 12..	152	47	Strong....	5	" ..	2,700	18	20	51½	"
13	Percy	" 12..	152	37	"	4	Bald...	2,360	18	..	52½	Frozen.
14	Captor.	" 13..	153	35	"	3	" ..	1,760	17	40	55½	Good sample.
15	Wellman's Fife....	" 3..	143	34	"	4	" ..	2,800	17	..	62	"
16	Beauty	" 12..	152	38	"	3½	" ..	2,200	16	40	56	"
17	Progress...........	" 12..	152	37	" ...	3	" ..	2,420	16	20	....	Badly frozen.
18	Crown	" 17..	157	32	"	3½	" ..	2,460	15	40	49	"
19	Monarch..........	" 17..	157	36	Weak	4½	" ..	3,080	15	20	....	"
20	Preston	" 12..	152	37	Strong....	4	Bearded	2,280	15	20	54½	"
21	Vernon......... .	" 12..	152	39	"	3	" ..	2,560	14	..	47½	Good sample.
22	White Russian ...	" 4..	144	31	" ...	3¾	Bald...	2,400	14	..	62½	"
23	Rideau	" 17..	157	26	Weak	3	" ..	2,540	13	40	....	Badly frozen.
24	Rio Grande...	" 17..	157	39	Strong....	4	Bearded	2,400	13	20	....	"
25	Countess....... ...	" 12..	152	36	"	3	Bald...	2,540	12	40	54	"
26	Ladoga......	" 12..	152	40	Medium..	4	Bearded	2,340	12	40	....	"
27	Roumanian.. ..	" 17..	157	39	Strong....	4	" ..	3,100	11	40	...	"
28	Red Fern	" 17 :	157	44	Medium..	4½	" ..	2,920	11	20	....	"
29	Dawn.	" 17..	157	33	Weak	3½	Bald ...	2,540	11	..	....	"

Twenty other varieties included in this test were a complete failure owing to winds, dry weather and frost.

TEST OF VARIETIES IN FIELDS OF ½ TO 10 ACRES.

As a considerable area of Brome and Native sod, broken and back-set, in 1899, was available for this year's crop, the greater part of the larger lots of spring wheat were sown on this land.

The sod, in all cases, had been broken 2 inches deep in May and June, and back-set 5 inches deep before harvest. After harvest the surface was made as fine as possible by repeated strokes of the disc-harrow.

As a comparative test, Red Fife wheat was sown on both Brome and Native sod. The grain on Brome sod appeared to stand the drought much better than that on Native sod, and produced a considerably larger crop of wheat. The soil in all cases was a clay loam.

WHEAT--FIELD AND ACRE LOTS.

Name of Variety.	Size of plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
					In.		In.		Lbs.	Bush.	Lbs.	Lb
Wellman's Fife root land)..	2½ ac.	April 11	Aug. 8	119	34	Strong..	3¾	Bald...	2,610	17	40..	62¼
Red Fife (on brome sod)....	1½ "	" 6	" 9	125	34	" ..	3	" ...	2,700	17	20..	62
Preston (on sod) rye grass..	5 "	" 10	" 4	116	35	" ..	3½	Bearded	2,660	16	10..	63¼
Stanley (on root land)......	4½ "	" 10	" 2	114	36	" ..	3¾	Bald...	3,000	15	....	63¾
Hungarian (on sod) rye grass	½ "	" 10	" 8	120	33	Weak..	3½	Bearded	2,740	12	40..	63½
Red Fern (on sod) "	1½ "	. 10	" 8	120	34	Medium	4	"	2,690	12	30..	64¾
Red Fife (on sod) native....	10 "	" 9	" 6	119	37	Strong..	3½	Bald...	2,880	11	....	62¼
Percy (on sod) native.......	4 "	" 11	" 8	119	27	" ..	3	" ...	2,000	6	50..	60½

The Red Fife and Percy on sod of native grass were both damaged by gophers.

The root land mentioned above was ploughed 6 inches deep in fall of 1899. The sod had been broken and back-set in summer of 1899.

EXPERIMENT WITH SPELTZ WHEAT.

A test was made with this variety of bald wheat, in which the husk adheres closely to the kernel. It was sown on clay loam, April 13, and cut September 10. The time to mature was 149 days. Yield of straw, 2,000 pounds ; of grain, 22 bushels per acre; weight per measured bushel, 43½ pounds.

TEST OF BLUE-STONE AS A PREVENTIVE OF SMUT IN WHEAT.

As the efficacy of blue-stone as a preventive of smut in spring wheat has been clearly demonstrated in previous years, this test was made to find if the length of time the seed is allowed to remain in the solution, has any effect on the result. Very smutty Red Fife seed was used.

Seed.	Condition.	Treatment.	On 25 Sq. Feet.	
			Good Heads.	Smutty Heads.
Red Fife..........	Smutty.........	1 lb. blue-stone to 15 bush. wheat. Dipped two minutes....................................	240	5
"	"	1 lb. blue-stone to 5 bush. wheat. Dipped fifteen minutes....................................	239	0
"	"	Check-plot. Untreated........................	110	123

TEST OF FERTILIZERS.

Various statements having been made as to the stimulating effect of certain fertilizers on the young grain plants, if sown with or shortly after the seed, six plots of summer-fallow, of one-fortieth of an acre each, well sheltered from winds by maple hedges, were chosen and sown on April 18, with Red Fife wheat, by drill, at the rate of 1½ bushels per acre, and treated as per statement below.

It will be noticed that the plots treated with a mixture of the fertilizers gave slightly the better yield, but at no time while the grain was standing was the effect of any of the fertilizers at all apparent.

SEED, RED FIFE—TEST OF FERTILIZERS.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	
			In.		In.		Lbs.	Bush.	Lbs.
Plot No. 1.									
Nitrate of soda, 100 lbs. per acre. (½ sown when grain was 2 in. high, balance when 6 in. high)	Aug. 16.	120	35	Strong..	4	Bald .	1760	27	20
Plot No. 2.									
Nitrate of soda, 200 lbs. per acre. (½ sown when grain was 2 in. high, balance when 6 in. high)	Aug. 16.	120	34	" ..	3½	" .	1760	27	20
Plot No. 3.									
Superphosphate No. 1, 400 lbs. per acre. (Sown before grain and harrowed)	Aug. 16.	120	31	" ..	3¾	" .	1600	30	
Plot No. 4.									
Check-plot. Unfertilized	Aug. 16.	120	31	" ..	3½	" .	1740	27	40
Plot No. 5.									
Muriate of potash, 200 lbs. per acre. (Sown before grain and harrowed)	Aug. 16.	120	33	" ..	3½	" .	1960	30	40
Plot No. 6.									
Superphosphate No. 1, 200 lbs. per acre. Muriate of potash, 100 " " Nitrate of soda, 100 " " (½ sown before grain and harrowed, balance when grain was 2 in. high.)	Aug. 16.	120	30	" ..	3½	" .	1860	32	20

EXPERIMENTS WITH OATS.

Fifty-nine varieties of oats were sown on fallow-land on May 1 by hoe-drill, 2 inches deep, at the rate of 2½ bushels per acre; plots, one-twentieth acre; soil, clay loam.

All were completely destroyed by wind and dry weather, and on June 4 nine of the most severely injured, at that time, were resown. On June 13 the balance had entirely succumbed and were re-seeded.

Had all been resown on June 4 good returns would, no doubt, have been secured from all the varieties, but the greater number of plots had been allowed to remain until the 13th in the hope that they would recover. The heavy winds and drouth, however, continued and re-seeding had to be done, but it proved too late, as the plots were uncut when frost came on September 13 and were rendered useless except for fodder, of which, however, a heavy and fine crop was secured. Five pounds of twine per acre was required to bind the crop. Under the circumstances these results give no reliable indication as to the relative productiveness of the varieties.

Oats—Test of Varieties.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1 Improved American........	Sept. 7.	95	48	Strong..	9	Branching	4,600	76	16	37
2 Early Blossom..............	" 17.	105	50	" ..	11	Sided.....	4,700	64	24	35
3 Improved Ligowo..........	" 10.	98	50	" ..	7½	Branching	4,700	61	26	37½
4 Wide-awake.................	" 7.	95	45	" ..	8	" .	4,820	61	6	38½
5 Banner.......................	" 17.	105	45	" ..	8½	" .	5,380	59	14	33
6 Abundance..................	" 17.	105	40	" ..	8	" .	5,180	58	28	34
7 Bavarian.....................	" 17.	105	40	" ..	10	" .	4,700	57	22	32½
8 Early Archangel............	" 7.	95	47	" ..	10	" .	5,080	56	16	39
9 Bonanza.....................	" 7.	95	38	Medium	10½	" .	4,200	32	12	41½

The other fifty varieties which were resown June 15 were a complete failure owing to winds, dry weather and frost.

Oats—Acre and Field Lots.

Fifteen varieties were sown from April 26 to May 1 on clay loam, six of which were blown out and had to be re-sown. Frost on September 13 rendered these fields useless except for feed, of which a very heavy crop was secured.

With the exception of one field of 9½ acres of Banner oats, which was protected by trees and the railway bank, all the fields not entirely killed, were more or less thinned by winds and produced very small crops.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
	Acres.				In.		In.		Lbs.	Bush.	Lbs.	Lbs
Banner............	9	April 26..	Aug. 10..	106	51	Strong..	9	Branching	5,100	55	..	36½
American Beauty......	1	May 1..	" 13..	104	43	" ..	7½	" ..	4,000	30	26	35½
Banner.	2	April 30..	" 13..	105	41	" ..	8½	" ..	4,100	27	2	35
Improved Ligowo.....	2½	" 30..	" 3..	95	43	" ..	7	" ..	4,340	25	18	36½
Wide-awake.	2½	" 30..	" 14..	106	38	" ..	7	" ..	3,600	23	22	35½
Abundance............	2½	" 30..	" 14..	106	37	" ..	8½	" ..	3,330	23	22	34½
Siberian O. A. C......	1	May 1..	" 14..	105	38	Medium	7½	" ..	3,200	22	6	33½
New Zealand..........	½	" 1..	" 14..	105	45	Strong..	11	" ..	3,680	19	28	31
Thousand Dollar	½	" 1..	" 14..	105	40	" ..	8	" ..	3,040	16	14	30
Bavarian.	½	" 1..	" 11..	102	35	Medium	7	" ..	2,400	15	12	32
		Sown.	Re-sown.									
Holstein Prolific	2	April 30 .	June 15..	*								
White Schonen........	2	" 30..	" 15..	*								
Bonanza.......	2	" 30..	" 15..	*								
Oderbruch............	2	May 1..	" 15..	*								
Columbus.............	2	April 30..	" 15..	*								
Golden Beauty...... .	1	May 1..	" 15..	*								

* Frozen on September 13; cut for fodder.

TEST OF FORMALIN AND MASSEL POWDER FOR THE PREVENTION OF SMUT IN OATS.

The seed used in this test was considerably affected with smut and the result of the test indicates that to be entirely effectual, the solution of Formalin should be applied to the seed for at least one hour.

Where the Massel powder and lime were used, no smutty heads were found. When the smutty grain was soaked in Formalin for one hour, the treatment was equally effective.

Seed.	Condition.	Treatment.	On 25 Sq. Feet. Good Heads.	Smutty Heads.
Doncaster Prize...	Smutty.	Formalin $4\frac{1}{2}$ oz. to 10 galls. water ; soaked 1 hour	180	0
" ...	" .	" " " " 15 minutes	170	32
" ...	" .	" " " " 5 "	161	39
" ...	" .	" 6 " " " 5 "	191	59
" ...	" .	" 9 " " sprinkled.......... ...	201	39
" ...	" .	Check plot ; untreated	165	94
Bavarian	" .	Massel powder 4 oz., lime 2 lbs., water 2 galls. ; sprinkled..	259	0

EXPERIMENTS WITH BARLEY.

Thirty varieties of 6-rowed and twenty varieties of 2-rowed barley were sown on one-twentieth of an acre plots of fallow-land, on May 7 and 8, by hoe-drill, two inches deep, at the rate of two bushels seed per acre. Soil, clay loam.

All came up well and were several inches high when struck by successive winds and dry weather, which completely destroyed every plot. On June 4, a number of the weakest were re-sown, and when the balance had succumbed on June 13, the re-seeding was completed. The late sown, however, did not ripen, and was cut for fodder, of which an immense crop was secured. Under the circumstances these results give no reliable indication as to the relative productiveness of varieties.

BARLEY—TWO-ROWED—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing, May 7 & 8.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre. Bush.	Yield per Acre. Lbs.	Weight per Bushel.
		Re-sown.			In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Sidney....	June 4..	Sept. 18..	106	34	Strong..	$3\frac{1}{2}$	3,600	34	8	53
2	Nepean.....	" 4..	" 17..	105	37	" ..	$3\frac{1}{4}$	3,880	28	16	
3	Kirby.........	" 4..	" 18..	106	35	Medium	4	3,180	27	24	
4	Clifford	" 4..	" 18..	106	42	Strong..	3	4,080	20	40	
5	Dunham	" 4..	" 18..	106	40	Medium	$3\frac{1}{2}$	3,800	20	20	
6	Fulton..	" 4..	" 18..	106	40	Strong..	$3\frac{1}{2}$	3,940	20	..	$46\frac{1}{2}$
7	Jarvis......	" 4..	" 18..	106	44	" ..	6	4,200	15	..	
8	Canadian Thorpe	" 4..	" 12..	100	30	" ..	3	3,280	15	..	51

The remaining twelve varieties, re-sown June 13, were a complete failure, owing to winds, dry weather and frost.

BARLEY—SIX-ROWED—TEST OF VARIETIES SOWN ON SAME DATE.

Number.	Name of Variety.	Date of Sowing May 7-8	Date of Ripening.	Number of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per acre.		Weight per Bushel.
		Resown.			Inch.		Inch.	Lbs.	Bush.	Lbs.	Lbs.
1	Odessa	June 4	Aug. 30	87	36	Strong	3	3,560	55	..	48
2	Mensury	" 4	" 30	87	35	"	3	4,000	54	8	50
3	Common	" 4	" 27	84	34	"	3	2,560	50	40	52
4	Rennie's Improved.	" 4	" 30	87	33	"	2¼	4,400	46	12	49
5	Petschora	" 4	Sept. 18	106	35	"	3	3,800	42	4	..
6	Royal	" 4	Aug. 30	87	33	"	3¼	3,200	41	32	50
7	Trooper	" 4	" 31	88	32	"	2¾	3,080	40	..	49½
8	Surprise	" 4	Sept. 18	106	29	Medium	4¾	2,800	38	36	..
9	Blue Long Head	" 4	" 17	105	40	Strong	4	3,420	37	4	41
10	Summit	" 4	" 18	106	40	"	3	3,240	36	32	49
11	Pioneer	" 4	" 18	106	38	"	3¼	3,640	36	12	..
12	Stella	" 4	" 18	106	33	"	3	3,420	33	36	..
13	Vanguard	" 4	" 12	100	34	Medium	3	3,600	33	16	49
14	White Hulless	" 4	" 10	98	24	Strong	2½	3,680	31	32	55
15	Brome	" 4	" 18	108	40	"	3	3,240	30	40	..
16	Nugent	" 4	" 18	108	34	"	2¾	3,440	27	24	..
17	Garfield	" 4	" 18	108	44	"	3¼	4,180	25	20	44
18	Phœnix	" 4	" 10	98	29	"	2¾	4,220	24	28	49½

The remaining twelve varieties, re-sown June 13, were a complete failure, owing to winds, dry weather and frost.

FIELD AND ACRE PLOTS.

Twelve varieties were sown on fallow-land, and, in addition, Sidney, one of the same varieties, was sown on Brome back-setting. The soil was clay loam. All but Sidney were destroyed. Seven of the fallow plots were re-sown on June 4, and the balance on June 13.

The varieties sown on the former date ripened ; the latter were cut for fodder, after frost on September 13.

BARLEY.—ACRE AND FIELD LOTS, SOWN MAY 7 AND 8.

Name of Variety.	Size of Plot.	Resown.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of growth.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
					In.		In.		Lbs.	Bush.	Lbs.	Lbs
Mensury	1 acre	June 4	Aug. 27.	84	31	Strong	3	6 rowed.	3330	49	30	48⅓
Royal	1 "	" 4	" 27.	84	33	Medium	3	6 "	3600	47	20	47⅓
Odessa	¾ "	" 4	Sept. 12	100	37	Strong	2¾	6 "	3520	37	16	49½
Oderbruch	¾ "	" 4	Aug. 27.	84	30	Medium	2¾	6 "	3000	36	..	....
Canadian Thorpe	1 "	" 4	Sept. 17	105	35	Strong	3½	2 "	3600	35	42	50
Sidney (on Brome Sod, broken and backset 1899)	3½ "	Sown. May 7	Aug. 15.	100	37	"	4½	2 "	3420	32	40	52
		Resown.										
Trooper	1 "	June 4	" 27.	84	32	"	3	6 "	2800	32	24	48¾
Rennie's Improved	1 "	" 4	" 27.	84	29	"	3	6 "	2660	32	4	50
		Sown	Resown.									
Sidney	1 "	May 8	June 13.									
Beaver	2 "	" 8	" 13.									
Common	1 "	" 7	" 13.	Frozen on Sept 13. Cut for fodder.								
Bolton	1 "	" 8	" 13.									
French Chevalier	1 "	" 7	" 13.									

TEST OF FORMALIN AND MASSEL POWDER FOR THE PREVENTION OF SMUT IN BARLEY.

The seed used was uniformly smutty. The grain grown on check-plot was very smutty, and totally unfit for any purpose except feed.

Seed.	Condition.	Treatment.	On 25 Sq. Feet. Good Heads.	On 25 Sq. Feet. Smutty Heads.
Odessa	Smutty.	Formalin $4\frac{1}{2}$ oz. to 10 galls. water; soaked 1 hour	185	0
"	"	" " " " 15 minutes	167	0
"	"	" " " " 5 "	191	5
"	"	" 9 " " sprinkled	181	0
"	"	" 6 " " soaked 5 minutes	165	0
"	"	Check plot; untreated	176	27
Canadian Thorpe	"	Massel powder 4 oz., lime 2 lbs., water 2 galls.; sprinkled	209	0

EXPERIMENTS WITH PEASE.

Fifty-seven varieties were sown on one-twentieth acre plots of fallow-land, on May 10, by hoe-drill, at the rate of 2 bushels small, 3 bushels medium, and $3\frac{1}{2}$ bushels large pease per acre. Soil, clay loam.

Only sixteen varieties escaped destruction by winds and dry weather.

Those destroyed were re-sown on June 14, but did not mature before frost came on September 13. A heavy crop of straw was, however, secured for fodder.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Sowing.	Date of ripening.	Number of days maturing.	Character of growth.	Length of Straw.	Weight of Straw.	Length of pod.	Size of pea.	Yield per Acre. Bush.	Yield per Acre. Lbs.
						In.	Lbs.	In.		Bush.	Lbs.
1	Pearl		Aug. 25.	107	Strong	41	4,800	3	Large	33	..
2	Prince		" 26.	108	"	40	6,000	$2\frac{3}{4}$	Small	32	40
3	Perth		" 25.	107	Medium	33	4,400	$2\frac{1}{2}$	Medium	32	20
4	Prussian Blue		" 27.	109	Strong	44	5,400	3	"	28	20
5	Elder		" 31.	113	"	38	4,400	$2\frac{1}{2}$	Large	27	20
6	Elliot		" 28.	110	"	42	4,600	$2\frac{3}{4}$	"	26	40
7	Kent		" 27.	109	"	39	5,200	3	Medium	26	..
8	Golden Vine		" 21.	103	Medium	36	5,600	$2\frac{1}{4}$	Small	25	40
9	Picton		" 24.	106	Strong	35	5,200	3	Large	25	20
10	Pride		" 24.	106	"	47	4,700	$2\frac{1}{2}$	"	25	..
11	Arthur		" 21.	103	"	38	5,000	3	"	23	40
12	Trilby		" 24.	106	"	36	5,400	3	"	23	20
13	Paragon		" 23.	105	"	35	4,200	3	"	20	..
14	Canadian Beauty		" 27.	109	"	38	5,000	$3\frac{1}{4}$	"	20	..
15	Vincent		Sept. 6.	119	Medium	36	3,800	3	Medium	16	..
16	New Potter		Aug. 23.	105	Strong	36	4,300	3	Large	14	..
18	Pease—Golden Vine	May 16.				23	Ploughed under July 28 in pod.				
19	Tares	" 16.				13	" " " 28 "				
20	Red Clover	" 16.	Resown June 18			7	" " Sept 10 "				
21	Alsike and Lucerne	" 16.				26	" " " "				
22	Fallow	Ploughed June 6 and cultivated several times to keep weeds down.									

The remaining forty-one varieties were a complete failure owing to winds, dry weather and frosts.

NOTE.—Plots No. 17 to 21 inclusive, were harrowed after ploughing.

EXPERIMENTS WITH INDIAN CORN.

Thirty-one varieties of Indian Corn were sown, in rows 32 inches apart, and planted in hills 32 inches apart each way, on May 19. Soil, clay loam.

The hills were protected by a hedge, and produced a very satisfactory crop, but the rows, which were on an exposed portion of the field, were repeatedly swept by winds, and injured to such an extent that the late rains did no good.

The yield of hills was computed from the weight of two rows, each 66 feet long.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Height.	When Tasselled.	In Silk.	Early Milk.	Late Milk.	Condition when Cut.	Weight per Acre. Grown in Hills.	
			Inches.						Tons.	Lbs.
1	Early Yellow Long-eared	Strong....	93	Aug. 18..	Aug. 30.	Sept. 5.	......	Early milk	18	960
2	Angel of Midnight......	Medium..	86	" 20..	" 30.	" 5.	......	" .	18	190
3	Thoro'bred White Flint..	Strong....	83	" 20..	" 28.	....	......	Tassel ...	17	1,420
4	Early Mastodon........	"	93	" 20..	Sept. 1.	....	......	Silk......	16	1,110
5	Mammoth 8-rowed Flint.	Medium..	88	" 20..	" 1.	Sept. 5.	......	Early milk	16	1,110
6	Compton's Early........	" ..	89	" 20..	" 1.	" 5.	......	" .	16	340
7	Longfellow..	Strong....	85	" 15..	Aug. 30.	....	......	Silk......	16	340
8	Champion White Pearl..	"	99	Sept. 1..	....	....	......	Tassel....	15	1,570
9	Cloud's Early Yellow...	"	90	Aug. 25..	Sept. 1.	....	......	Silk......	15	800
10	Canada White Flint....	"	89	" 18..	Aug. 30.	Sept. 7.	.....	Early milk	15	30
11	Mammoth Cuban.......	"	91	" 20..	Sept. 1.	....	......	Silk......	15	30
12	Evergreen Sugar........	Medium..	82	" 25..	....	....	......	Tassel....	14	1,260
13	Selected Leaming.......	Strong....	95	" 18..	Sept. 1.	Sept. 7.	......	Early milk	14	1,260
14	Early Butler...........	"	92	" 15..	Aug. 25.	" 1.	Sept. 7	Late milk.	14	490
15	Superior Fodder........	"	92	" 25..	Sept. 1.	" 7.	......	Early milk	14	260
16	North Dakota White....	"	79	" 15..	Aug. 30.	" 5.	......	" .	14	260
17	Giant Prolific Ensilage..	Medium..	88	" 25..	....	....	......	Tassel....	13	1,720
18	Pearce's Prolific.........	" ..	82	" 10..	Aug. 25.	Sept. 1.	Sept. 7	Late milk.	13	950
19	Red Cob Ensilage.......	Strong....	74	" 30..	....	....	......	Tassel....	13	950
20	Sanford..............	"	86	" 20..	Sept. 1.	Sept. 7.	......	Early milk	13	720
21	North Dakota Yellow...	Weak	66	" 18..	" 1.	" 7.	......	" .	13	180
22	King of the Earliest....	Medium..	85	" 25..	" 1.	....	......	Tassel....	13	180
23	Mitchell's Extra Early..	Weak	69	" 10..	Aug. 25.	Sept. 1.	......	Early milk	12	1,410
24	Pride of the North......	Strong....	86	" 25..	Sept. 1.	" 5.	......	" .	12	1,410
25	White Cap Yellow Dent	"	92	" 15..	Aug. 30.	" 7.	......	" .	12	640
26	Country Gentleman.....	"	71	Sept. 1..	....	....	......	Tassel....	11	1,870
27	Kendall's Early Giant..	Medium..	72	Aug. 10..	Aug. 25.	Sept. 1.	......	Early milk	11	1,870
28	Salzer's All Gold........	Strong....	85	" 20..	Sept. 1.	" 7.	......	" .	11	1,100
29	Extra Early Huron Dent	"	92	" 20..	" 1.	" 5.	......	" .	10	20
30	Early Yellow Six Weeks	Weak	64	" 10..	Aug. 25.	" 1.	Sept. 7	Late milk.	9	480
31	Extra Early Szekely....	"	73	" 10..	" 25.	" 1.	" 5	" .	9	480
32	Salzer's Earliest Ripe....	"	59	" 5..	" 20.	" 1.	" 7	" .	9	480

INDIAN CORN IN ROWS AT DIFFERENT DISTANCES.

Three varieties were sown on a plot protected by a hedge, in rows 21, 28, 35 and 42 inches apart, on May 19. The corn was cut for ensilage on September 4. The estimate of the yield is based upon the weight of crop produced on two rows, each 66 feet long.

Indian Head, N.W.T. Planting in front of Superintendent's house.

INDIAN CORN—TEST OF SEEDING AT DIFFERENT DISTANCES.

Name of Variety.	Distance between Rows.	Character of Growth.	Height.	When Tasselled.	Condition when cut.	Weight per Acre Grown in Rows.	
	Inches.		Inches.			Tons.	Lbs.
Selected Leaming	21	Strong	89	Aug. 25	Early Milk	23	200
" "	28	"	88	" 25	"	17	1,640
" "	35	"	95	" 15	"	15	800
" "	42	"	90	" 20	"	16	1,000
Longfellow	21	Medium	90	" 20	"	18	960
"	28	"	88	" 25	Tassel	19	1,600
"	35	Strong	91	" 15	Early Milk	20	810
"	42	"	89	" 20	"	16	1,600
Champion White Pearl	21	"	88	" 25	Tassel	22	880
" "	28	"	103	" 25	"	22	1,540
" "	35	"	98	" 20	Early Milk	19	1,270
" "	42	"	97	" 20	"	18	1,620

ROTATION OF CROPS.

The plan inaugurated in 1899 for a rotation of crops was followed out this year, but on account of winds and dry weather, the results are far from satisfactory.

PLAN FOR SERIES OF ROTATION OF CROPS BEGINNING IN SPRING OF 1899.

Plot No.	1899.	1900.	1901.
1	Wheat	Oats	Soja Beans.
2	Wheat	Wheat	Pease.
3	Wheat	Oats	Tares.
4	Wheat	Wheat	Red Clover.
5	Wheat	Barley	Alsike and Lucerne.
6	Pease	Wheat	Wheat.
7	Tares	Wheat	Oats.
8	Soja Beans	Wheat	Oats.
9	Red Clover	Wheat	Wheat.
10	Alsike and Lucerne	Wheat	Barley.
11	Rape	Wheat	Summer-fallow.
12	Wheat	Wheat	Summer-fallow.
13	Wheat	Oats	Summer-fallow.
14	Wheat	Barley	Summer-fallow.
15	Wheat	Wheat	Oats.
16	Wheat	Barley	Oats.
17	Oats	Soja Beans	Wheat.
18	Wheat	Pease	Wheat.
19	Oats	Tares	Wheat.
20	Wheat	Red Clover	Wheat.
21	Barley	Alsike and Lucerne	Wheat.
22	Rye	Summer-fallow	Wheat.

ROTATION TEST—SECOND YEAR 1900—PLOTS HALF ACRE EACH.

Stubble ploughed five inches deep, last week in October, 1899, and harrowed. Ploughed again before seeding (three inches deep), 1900.

Plot.	Variety.	Soil.	Date of Sowing.	Date of Ripening.	No. Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw per Acre.	Yield of Grain per Acre. Bush	Lbs.
						in.		in.		Lbs.		
1	Oats	Clay loam.	April 27..	Aug. 3..	115	18	Stiff	7	Branching..	1,220	11	2
2	Wheat, Red Fife ..	" ..	" 9..	" 8..	121	16	"	3	Bald	730	4	20
3	Oats, Banner......	" ..	" 27..	" 3..	115	18	"	$7\frac{3}{4}$	Branching..	1,110	11	..
4	Wheat, Red Fife ..	" ..	" 9..	" 8..	121	15	"	$2\frac{3}{4}$	Bald	850	5	..
5	Barley, Canadian Thorpe..........	" .	May 9..	" 20..	103	14	Weak ..	3	Two-rowed..	500	9	44
6	Wheat, Red Fife ..	" ..	April 9..	" 13..	126	38	Strong..	$3\frac{1}{2}$	Bald	1,960	16	50
7	" " ..	" ..	" 9..	" 13..	126	39	" ..	$3\frac{1}{2}$	"	2,100	19	30
8	" " ..	" ..	" 9..	" 13..	126	34	" ..	$3\frac{1}{4}$	"	2,000	18	20
9	" " ..	" ..	" 9..	" 13..	126	24	" .	3	"	1,330	11	20
10	" " ..	" ..	" 9..	" 13..	126	21	" ..	3	....	1,100	8	20
11	" " ..	" .	" 9..	" 13..	126	21	" ..	3	....	1,250	10	40
12	" " ..	" .	" 9..	" 8..	121	21	" ..	3	Bald	970	7	40
13	Oats, Banner......	" ..	" 27..	" 3..	115	18	Stiff....	$7\frac{3}{4}$	Branching..	990	9	14
14	Barley, Canadian Thorpe..........	" ..	May 9..	" 20..	103	15	Weak ..	3	Two rowed..	410	4	32
15	Wheat, Red Fife ..	" ..	April 9	" 8..	121	16	Stiff....	3	Bald	700	4	30
16	Barley, Canadian Thorpe..........	" ..	May 9.	" 20..	103	18	Weak ..	3	Two rowed..	640	9	
17	*Soja Beans.......	" ..	" 16..	....	....	18	....	....	....	......	......	
18	†Pease, Gold'n Vine	" ..	" 16..	....	....	23	......	....	....	......	......	
19	†Tares	" ..	" 16..	....	....	15	......	....	....	......	......	
20	‡Clov'r, Com'on Red	" ..	" 16..	....	....	7	....	....	....	.....	....	
21	‡ " Alsike and Lucerne	" ..	" 16..	....	....	10	.....	....	....	......	.....	
22	§Fallow	" ..	....	....	....	...	....	....	....	......	.. .	

* Ploughed under August 3.
† Ploughed under July 28.
‡ Ploughed under September 10.
§ Ploughed June 6, seven inches deep, and cultivated four times during summer.

Summary of Results for Two Years.

Plot.	Variety. 1899.	Yield per Acre. Bush.	Lbs.	Variety. 1900.	Yield per Acre- Bush.	Lbs
1	Wheat, Red Fife.......................	36	6....	Oats, Banner.....................	11	2
2	"	35	40....	Wheat, Red Fife	4	20
3	"	36	...	Oats, Banner...........	11	
4	"	35	46....	Wheat, Red Fife.	5	
5	"	35	40....	Barley, Canadian Thorpe..........	9	44
6	Pease, Golen Vine............. (Ploughed under)	July	20...	Wheat, Red Fife...............	16	50
7	Tares....	"	20 ..	"	19	30
8	Soja Beans...........	"	20...	"	18	20
9	Clover, Common Red..........	Sept	10...	"	11	20
10	" Alsike and Lucerne.....	"	10...	"	8	20
11	Rape...........................	Aug.	15...	"	10	40
12	Wheat, Red Fife...	36	6....	"	7	40
13	"	35	36 ...	Oats, Banner.................	9	14
14	"	35	40....	Barley, Canadian Thorpe.... . .	4	32
15	"	36	....	Wheat, Red Fife..............	4	30
16	"	35	20....	Barley, Canadian Thorpe.........	9	4
17	Oats, Banner......	85	....	Soja Beans................. (Ploughed under)	Aug. 3	
18	Wheat, Red Fife.............	36	16. ..	Pease, Golden Vine...... ...	July 28	
19	Oats, Banner....	86	24....	Tares.........................	"	
20	Wheat, Red Fife........	36	...	Clover, Common Red........	Sept. 10	
21	Barley, Canadian Thorpe............	46	....	" Alsike and Lucerne . .	"	
22	Rye, Spring..	41	....	Fallow...............		

EXPERIMENTS WITH FLAX.

Sowing different quantities per acre, and at different dates. Soil, clay-loam, summer-fallow. Sown by hoe-drill.

Seed per Acre.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Weight of Straw.	Yield per Acre.	
					In.		Lbs.	Bush.	lbs.
40 lbs.	1/11 acre	May 15	Aug. 20	97	27	Weak	280	*	
80 "	"	" 15	" 20	97	28	Medium	1,260	11	12
40 "	"	" 22	" 20	90	28	Strong	2,170	11	22
80 "	"	" 22	" 20	90	26	"	2,100	12	8
40 "	"	" 29	" 20	83	31	"	1,540	13	18
80 "	"	" 29	" 20	83	28	"	1,680	12	34
40 "	"	June 6	" 31	86	30	"	1,470	12	36
80 "	"	" 6	" 20	75	30	"	1,890	10	44

Experiments were made with buckwheat and tares, but in both instances the crop was destroyed by wind.

EXPERIMENTS WITH MILLETS.

(Plots 1-20th Acre each.)

White Round Extra French,
Moha Hungarian,
Algerian,
Japanese,
Italian,
Pearl,
Golden.

(Sown May 18.)

All except Japanese were killed out by drought.
Japanese, cut for ensilage September 5, in head.
Yield, 12 tons 1,000 pounds per acre.

EXPERIMENT WITH CANARY-GRASS.

(*Phalaris canariensis.*)

Sown May 15 ; cut August 20 ; time to mature 90 days.
Straw, 36 inches long ; heads, 1½ inches long ; straw, strong.
Weight of straw, 3,350 pounds per acre.
Yield per acre, 23 bushels 20 pounds.

EXPERIMENT WITH WHITE FLAX.

(Received from Alfred Boyd, Esq., Toronto, Ont.)
Sown May 22 ; cut September 10 ; straw, 12 inches long.
This flax made a weak growth and ripened very unevenly.

* Destroyed by wind

EXPERIMENT WITH SUNFLOWERS.

(Plot 1-20th Acre.)

Mammoth Russian—Sown May 25 ; frozen September 13 ; height, 7 feet.

A few heads which had matured before frost came were saved but the greater portion of the crop was lost.

EXPERIMENT WITH SPRING RYE.

(Plot 3 Acres.)

Sown May 22 ; cut September 3 ; time to mature 104 days.

Straw, 38 inches long ; growth, strong ; length of head, 4 inches ; yield of straw, 3,800 pounds per acre, of grain, 21 bushels 26 pounds per acre.

EXPERIMENTS WITH HORSE BEANS.

(Sown in rows in 1-20th acre plots on May 18.)

Rows, 21 inches apart ; height of straw, 33 inches ; length of pod, 3 inches ; cut September 10 ; yield, 6 tons 1,800 pounds per acre.

Rows, 28 inches apart ; height of straw, 29 inches ; length of pod, 3 inches ; cut September 10 ; yield, 8 tons 130 pounds per acre.

Rows, 35 inches apart ; height of straw, 35 inches ; length of pod, 3 inches ; cut September 10 ; yield, 8 tons 320 pounds per acre.

EXPERIMENTS WITH SOJA BEANS.

(Sown in rows in 1-20th acre plots on May 18.)

Rows, 21 inches apart ; length of straw, 32 inches ; yield, 8 tons 1,000 pounds per acre.

Rows, 28 inches apart ; length of straw, 31 inches ; yield, 7 tons 600 pounds per acre.

Rows, 35 inches apart ; length of straw, 31 inches ; yield, 7 tons 1,200 pounds per acre.

EXPERIMENTS WITH FIELD BEANS.

(1-20th acre plots, sown May 18 ; frozen September 13.)

Marrowfat—Length of straw, 29 inches ; yield, 5 tons 1,040 pounds per acre.
White Field—Length of straw, 28 inches ; yield, 3 tons 880 pounds per acre.
Mexican Tree—Length of straw, 17 inches ; yield, 1 ton 720 pounds per acre.
California Pea—Length of straw, 15 inches ; yield, 3 tons 880 pounds per acre.

EXPERIMENT WITH TURKESTAN ALFALFA.

(Size of plot, 1-20th acre.)

Sown in sheltered ground on May 22.

Catch good ; growth strong and even ; plants 24 inches high on October 1. This variety promises well.

HAY CROP.

BROME GRASS (*Bromus inermis*).

The seedings of Brome grass made previous to 1899 were too short to cut for hay, but after July 4, when rains commenced, good pasture was afforded by all the fields.

The seeding of 1899 was cut for seed on July 23. The seed was of excellent quality, but the crop was very light—85 pounds per acre.

Seeding—1900.

Ten acres were sown April 27, re-sown June 26. Good catch and the grass is in splendid condition for winter.

WESTERN RYE-GRASS (*Agropyrum tenerum*).

Old meadow too short to cut. Pastured after July 5.
The seeding of 1899 was cut for seed on July 28.
Seed of good quality, but the crop was very light.

Seeding—1900.

Four acres Western Rye grass, sown April 28. Re-sown June 26. A good catch.

Mixture of Brome grass and Western Rye grass. Five acres sown April 26. Resown June 25. A good catch.

SEEDING AND CULTIVATION OF BROME GRASS.

For information regarding the seeding and cultivation of Brome grass the following is quoted from the report of 1896 :—

'This grass is better sown alone ; at least it should not be sown with a grain crop. The grain takes too much moisture from the young grass-plants, only the most vigorous of which will survive the dry weather in September ; whereas, if sown alone all the plants have an equal chance.

'It is advisable to sow the seed on land that does not blow. Summer-fallow would be the best preparation, but on account of its liability to drift it is not safe in many parts of the Territories to use this kind of land. Stubble-land ploughed three or four inches deep in April or May, and well harrowed after the seed is sown is found to be quite safe from winds, as the stubble harrowed to the top prevents all drifting.

'Ten or twelve pounds of seed is required per acre. More seed will give a better crop the first year, but less afterwards, as the roots thicken up each year, and in three or four years this grass makes better pasture than hay.

'The seed being light, long and thin, seeding by hand is the only practicable method unless seeders constructed for the purpose are available. To seed properly a calm day should be chosen, so that all parts of the land may be evenly sown.

'While the plants are young, weeds are sure to make great headway, and it is necessary to keep them at least from going to seed. The quickest way to accomplish this is to go over the field with a mower, cutting just above the grass plants. If this operation has to be repeated it will be necessary to cut the tops of the grass, but this will not injure the plants, in fact it is an advantage in the way of giving the roots a firmer hold.

'The first crop of hay can be cut the next year after seeding, and will, in ordinary years, be ready early in July. Twenty days after being ready to cut for hay it will be fit to cut for seed if so desired.

'On this farm it has always been cut in first bloom for hay, and twenty days from this time it is considered in proper condition to cut for seed.

'In cutting for seed, a binder is used and the grass is cut, tied and stooked the same as wheat or other grain. In a week or ten days after cutting it is ready to thresh or store away.

'For threshing small quantities, the old fashioned flail is suitable, but for large lots a threshing machine should be used on which the wind has been shut off as much as practicable. From three to six hundred pounds of seed may be expected from an acre.'

EXPERIMENTS WITH FIELD ROOTS.

The root crop was, on the whole, a poor one. Turnips and mangels, while sound and good, were small : sugar-beets were small and carrots an entire failure, the seed not germinating till the end of July. Turnips and mangels were considerably injured by drifting earth cutting the young leaves.

The land used for roots was a clay loam, fallowed in 1899, and ploughed and harrowed before seeding, which, on account of the top soil drying out, proved detrimental to germination. Two sowings were made in each case, the second sowing about a week later than the first. The yield per acre has been calculated from the weight produced from two rows, each 66 feet long. In the following tables the results are given of the testing of twenty-eight varieties of turnips, twenty-two of mangels, and six of sugar beets :—

Turnips—Test of Varieties.

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
						Tons	lbs.	Bush.	lbs.	Tons	lbs.	Bush.	lbs.
1	Drummond Purple Top	May 18.	May 25.	Oct. 8..	Oct. 8..	20	545	675	45	8	1580	293	..
2	Perfection Swede.....	" 18.	" 25.	" 8..	" 8..	20	410	773	30	15	1590	526	30
3	Champion Purple Top.	" 18.	" 25.	" 8..	" 8.	19	1675	661	15	8	1040	284	..
4	Halewood's Bronze Top	" 18.	" 25.	" 8..	" 8..	19	1675	661	15	14	20	467	..
5	East Lothian........	" 18.	" 25.	" 8..	" 8..	19	1000	650	..	14	560	476	..
6	Carter's Elephant.....	" 18.	" 25.	" 8..	" 8..	19	310	638	30	6	1740	229	..
7	Webb's New Renown.	" 18.	" 25.	" 8..	" 8..	19	310	638	30	20	1625	693	45
8	Mammoth Clyde..	" 18.	" 25.	" 8..	" 8..	17	1700	595	..	13	400	440	..
9	Bangholm Selected ...	" 18.	" 25.	" 8..	" 8..	17	1565	592	45	12	315	405	15
10	Hartley's Bronze	" 18.	" 25.	" 8..	" 8..	17	350	572	30	10	235	377	15
11	Hall's Westbury......	" 18.	" 25.	" 8..	" 8..	17	80	568	..	12	999	416	30
12	Giant King	" 18.	" 25.	" 8..	" 8..	16	1675	561	15	9	1485	327	45
13	Skirving's......	" 18.	" 25.	" 8..	" 8..	16	400	540	..	15	780	513	..
14	Selected Champion ...	" 18.	" 25.	" 8..	" 8..	15	1995	533	15	15	1590	526	30
15	Selected Purple Top..	" 18.	" 25.	" 8 :	" 8.	15	1590	526	30	15	240	504	..
16	Prize Purple Top...	" 18.	" 25.	" 8..	" 8.	15	375	506	15	13	1480	458	..
17	Marquis of Lorne.....	" 18.	" 25.	" 8..	" 8..	15	240	504	..	14	560	476	..
18	Prize Winner..... ..	" 18.	" 25.	" 8..	" 8..	14	1505	491	45	9	525	308	45
19	Shamrock Purple Top.	" 18.	" 25.	" 8..	" 8..	14	1505	491	45	11	1040	384	..
20	Monarch.	" 18.	" 25.	" 8..	" 8..	14	1235	487	15	9	990	316	30
21	West Norfolk Red Top.	" 18.	" 25.	" 8..	" 8..	14	290	471	30	15	1320	522	..
22	Sutton's Champion....	" 18.	" 25.	" 8..	" 8..	13	670	444	30	16	400	540	..
23	New Arctic	" 18.	" 25.	" 8..	" 8..	12	315	405	15	8	350	272	30
24	Elephant's Master....	" 18.	" 25.	" 8..	" 8..	11	905	381	45	13	130	435	30
25	Imperial Swede.......	" 18.	" 25.	" 8..	" 8..	11	770	379	30	22	385	739	45
26	Kangaroo	" 18.	" 25.	" 8..	" 8..	10	70	334	30	7	415	240	15
27	Magnum Bonum....	" 18.	" 25.	" 8..	" 8..	8	1850	297	30	10	1825	363	45
28	Jumbo.	" 18.	" 25.	" 8..	" 8..	8	1175	286	15	12	1395	423	15

MANGELS—TEST OF VARIETIES.

Number.	Name o Variety,	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Tons	Lbs	Bus.	Lbs.	Tons	Lbs	Bus.	Lbs.
1	Champion Yellow Globe..	May 18.	May 25.	Sept. 28	Sept. 28	26	720	879	..	13	820	447	
2	Canadian Giant..........	" 18.	" 25.	" 28	" 28	24	1,590	826	30	11	740	379	
3	Gate Post..........	" 18.	" 25.	" 28	" 28	23	1,670	794	30	18	1,950	632	30
4	Giant Yellow Intermediate	" 18.	" 25.	" 28	" 28	20	1,370	689	30	16	370	539	30
5	Giant Yellow Globe......	" 18.	" 25.	" 28	" 28	20	5	666	45	13	160	436	
6	Giant Ye)low Half-long...	" 18.	" 25.	" 28	" 28	19	1,465	657	45	12	1,200	420	
7	Mammoth Long Red.	" 18.	" 25.	" 28	" 28	19	640	644	..	21	1,980	733	
8	Prize Mammoth Long Red	" 18.	" 25.	" 28	" 28	18	860	614	..	18	1,815	630	15
9	Gate Post Yellow.........	" 18.	" 25.	" 28	" 28	18	30	605	..	11	1,160	386	
10	Norbiton Giant...........	" 18.	" 25.	" 28	" 28	17	935	582	15	19	910	648	30
11	Mammoth Oval Shaped...	" 18.	" 25.	" 28	" 28	16	1,840	564	..	16	1,330	555	30
12	Selected Mammoth Long Red..........	" 18.	" 25.	" 28	" 28	16	1,330	555	30	23	590	776	30
13	Mammoth Yellow Intermediate	" 18.	" 25.	" 28	" 28	16	335	538	45	13	715	445	15
14	Half-long Sugar White...	" 18.	" 25.	" 28	" 28	13	1,270	454	30	15	1,920	532	
15	Warden Orange Globe.....	" 18.	" 25.	" 28	" 28	13	505	441	45	16	370	539	30
16	Half-long Sugar Rosy.....	" 18	" 25.	" 28	" 28	12	1,740	429	..	15	1,500	525	
17	Golden Fleshed Tankard..	" 18.	" 25.	" 28	" 28	12	1,620	427	..	12	660	411	
18	Yellow Intermediate......	" 18	" 25.	" 28	" 28	12	1,080	418	..	18	570	609	30
19	Ward's Long Oval-shaped.	" 18.	" 25.	" 28	" 28	12	795	413	15	15	1,500	525	
20	Lion Yellow Intermediate.	" 18.	" 25.	" 28	" 28	10	1,090	351	30	17	1,490	591	30
21	Yellow Fleshed Tankard..	" 18.	" 25.	" 28	" 28	7	520	242	..	12	795	413	15
22	Red Fleshed Tankard.....	" 18.	" 25.	*	*								

SUGAR-BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	1st Plot Sown.	2nd Plot Sown.	1st Plot Pulled.	2nd Plot Pulled.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
						Tons	Lbs	Bus.	Lbs.	Tons	Lbs	Bus.	Lbs.
1	Red Top Sugar.	May 18.	May 25.	Sept. 28	Sept. 28	12	930	415	30	15	1,125	518	45
2	Improved Imperial..	" 18.	" 25.	" 28	" 28	11	1,295	388	15	9	1,860	331	
3	Wanzleben..........	" 18.	" 25.	" 28	" 28	11	740	379	..	12	1,740	429	
4	Danish Red-top....... .	" 18.	" 25.	" 28	" 28	11	50	367	30	12	1,620	427	
5	Vilmorin's Improved......	" 18.	" 25.	" 28	" 28	10	1,090	351	30	11	1,970	399	30
6	Danish Improved.........	" 18.	" 25	" 28	" 28	10	970	349	30	10	10	333	30

EXPERIMENTS WITH POTATOES.

Eighty-two varieties of potatoes were planted on a low, damp plot of summer-fallow, which gave the seed a good start, and, on the whole, the crop was the most satisfactory ever grown on the farm. The growth of all varieties was very even, and the tubers very sound and large. The land was ploughed and harrowed immediately previous to planting. They were planted on May 14. The yield per acre has been calculated in each case from the weight of tubers obtained from two rows, each 66 feet long. No rot has occurred this season on any of the varieties under trial.

* Did not germinate.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Average Size.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
				Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Rochester Rose	Strong	Very large	722		708	15	13	45	Long, red.
2	American Wonder	Very strong.	"	662		607	15	54	45	" white.
3	American Giant	"	Large	656		608		48		" "
4	Empire State	"	"	607	15	552	30	54	45	" "
5	Seattle	"	Small	607	15	518	15	89		" flat, white.
6	Beauty of Hebron	Strong	"	598	15	568	30	29	45	Oval, red.
7	Uncle Sam	Very strong.	Very large	579	45	536	30	43	15	Long, white.
8	Irish Daisy	"	Small	573		516		57		" "
9	State of Maine	"	Large	570	45	552	30	18	15	" "
10	Delaware	Strong	Very large	570	45	543	30	27	15	" "
11	New Variety No. 1	Very strong.	"	561	30	536	30	25		Oval, "
12	Carman No. 1	"	Large	559	15	534	15	25		Long, "
13	Vick's Extra Early	Strong	"	556	30	508	30	48		" pink.
14	I. X. L	Very strong.	Very large	552	30	525	15	27	15	" red.
15	Everett	Strong	Large	550	45	477	15	73	30	Oval, pink.
16	Pearce's Prize Winner	"	Very large	545	30	518	15	27	15	Long, white.
17	Columbus	Very strong.	Large	541		520	30	20	30	" oval, red.
18	General Gordon	Medium	Very large	522	45	481	45	41		" red.
19	Brownell's Winner	Strong	Large	513	30	488	30	25		" "
20	Penn Manor	"	"	511	15	470	15	41		Oval, flat, red.
21	Bovee	Medium	Medium	508	30	475		33	30	" red.
22	Troy Seedling	Strong	"	507		461	15	45	45	Long, oval, white.
23	Prize Taker	Very strong.	"	502	30	479	30	23		Oval, red.
24	Rural Blush	"	"	501	15	476	15	25		" "
25	Country Gentleman	Strong	Very large	495	30	449	45	45	45	Long, pink.
26	Burnaby Seedling	Very strong.	"	495	30	443		52	30	" red.
27	Early Six Weeks	Weak	Medium	488	30	452		36	30	Oval, red.
28	Reeve's Rose	Strong	Large	485		448	30	36	30	" "
29	Lee's Favorite	"	"	481		447	30	33	30	Long, red.
30	Seedling No. 7	Very strong.	"	481		436		45		" "
31	Carman No. 3	"	"	478	45	442	15	36	30	Oval, white.
32	Rose No. 9	Strong	"	474	45	431	30	43	15	Long, red.
33	Late Puritan	Very strong.	"	472	45	427		45	45	" white.
34	Polaris	Medium	"	470	15	449	45	20	30	Oval, "
35	Sharpe's Seedling	Strong	"	468	15	438	30	29	45	Long, oval, red.
36	Northern Spy	Very strong.	"	465		461		4		" flat, red.
37	Irish Cobbler	Medium	"	465		431	30	33	30	Oval, white.
38	New Queen	Strong	Very large	462	15	448	30	13	45	" red.
39	Chicago Market	Medium	Medium	462	15	429	15	33		" white.
40	White Beauty	"	"	461	30	434		27	30	" flat, white.
41	Pride of the Market	Strong	"	460	15	427		33	15	Long, white.
42	Holborn Abundance	Very strong.	"	459		385	45	73	15	Oval, "
43	Vanier	"	Large	452		417	45	34	15	Long, red.
44	Lizzie's Pride	"	Medium	452		436		16		" white.
45	Early Harvest	Medium	Large	440	45	411		39	45	Oval, "
46	Thorburn	"	Medium	440	45	413	15	27	30	" red.
47	Dakota Red	Very strong.	Very large	436		395		41		Long, red.
48	Bill Nye	Strong	Medium	433	45	385	45	48		" flat, white.
49	Maule's Thorobred	"	"	431	15	404		27	15	" oval, red.
50	Houlton Rose	Medium	Large	424	30	372		52	30	" red.
51	Early Sunrise	Very strong.	Medium	422	30	392	45	29	45	" "
52	Dreer's Standard	Very strong	Medium	418		372	15	45	45	Long, white.
53	Clarke's No. 1	Strong	"	418		372	15	45	45	Long, red.
54	Cambridge Russet	"	"	417	45	383	30	34	15	Long, flat, white
55	Seedling No. 230	"	Large	417	45	404	..	13	45	Round, white.
56	Maggie Murphy	"	Medium	410	45	392	30	18	15	Oval, red.
57	Hale's Champion	"	Large	408	45	363	..	45	45	Oval, white.
58	Wonder of the World	Medium	Medium	408	45	363	..	45	45	Oval, red.
59	Early Puritan	"	"	408	45	379	..	29	45	Oval, white.
60	Earliest of All	Strong	Large	408	45	386	..	22	45	Long, pink.
61	Rural No. 2	Very strong	"	397	30	374	30	23	..	Long, white.
62	Daisy	Medium	Medium	397	30	360	45	36	45	Long, oval, red.
63	Brown's Rot-proof	Strong	"	396	..	350	15	45	45	Long, red.
64	Burpee's Extra Early	Weak	"	388	..	335	30	52	30	Oval, red.

	Name of Variety.	Character of Growth.	Average Size.	Total Yield Per Acre.		Yield Per Acre of Marketable.		Yield Per Acre of Unmarketable.		Form and Colour.
				Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
65	Quaker City	Very strong	Large	388	..	372	..	16	..	Long, white.
66	Early Market	Weak	"	379	..	356	15	22	45	Long, oval, red.
67	Early Rose	Medium	"	372	15	326	30	45	45	Long, red.
68	Early White Prize	"	"	369	45	315	..	54	45	Oval, white.
69	Clay Rose	Very strong	Medium	358	15	333	15	25	..	Long, oval, red.
70	Reading Giant	Medium	Small	354	45	287	45	57	..	Long, red.
71	Flemish Beauty	Strong	Large	348	30	324	15	24	15	" "
72	Ohio Junior	Weak	Medium	348	30	315	..	33	30	Oval "
73	Great Divide	Medium	Small	344	45	283	15	61	30	Long, flat, white
74	Green Mountain	Strong	Medium	342	30	299	..	43	30	Long, white.
75	Pearce's Extra Early	Weak	Large	331	..	296	45	34	15	Oval, red.
76	Early Ohio	"	Medium	312	45	287	45	25	..	Round, red.
77	Early Michigan	"	Large	312	45	383	..	29	45	Oval, flat, brown
78	Sir Walter Raleigh	Strong	"	308	15	285	30	22	45	Oval, white.
79	Swiss Snowflake	Medium	Small	308	15	248	45	59	30	Round, white.
80	Early Norther	"	"	294	30	269	30	25	..	Long, pink,
81	Moneymaker	Very strong	"	283	..	194	..	89	..	Long, flat, white
82	McIntyre	"	"	217	..	187	15	29	45	Long. pink.

VEGETABLE GARDEN.

On account of the protracted dry weather, all garden vegetables made poor progress, in fact, very little seed germinated in the open until after July 4, when the rains commenced. This made a very short season, and vegetables of all kinds were a comparative failure.

Cabbage did fairly well, but on account of too rapid growth during August, almost all the varieties split, and were more or less spoiled. Celery grew very large, but the stalks rusted badly. Cauliflower did well. Onions were a very light crop, a large portion of the seed failing to germinate. Melons and citrons were a complete failure. Squash and marrows did well, but were not as prolific as usual. Beets, carrots and turnips germinated very badly, and the roots that did grow were coarse and stringy. Lettuce and radish were a complete failure till after the rains commenced, and pease were almost as bad.

ASPARAGUS.

Conover's Colossal.—In use May 1 to July 15. Light crop.
Donald's Elmira.—In use May 1 to July 19. Light crop.
Barr's Mammoth.—In use May 1 to July 19. Light crop.

New Seeding.

Columbian Mammoth White (Ferry).
Columbian Mammoth White (McInnis).
Palmetto.
Donald's Empire.
Barr's Mammoth.
Conover's Colossal.

The above were all sown on May 4. On account of the extreme dry weather, the germination was weak and growth slow till rains came in July and August, when the plants made some progress.

BEANS.—Sown in the open air on May 8.

Variety.	In use.	Ripe.	Remarks.
Wardwell's Kidney Wax	July 25	Aug. 17	Good cropper.
Burpee's Bush Lima	" 30	" 17	Fair "
Challenge Dwarf Wax	" 20	" 15	Good, very early.
Extra Early Round-Pod Valentine	" 28		Small, did not ripen.
Valentine	" 25	Aug. 20	Good cropper.
Detroit Wax	" 15	" 10	Medium, early.
Black Butter			Runner. Late.
Andalusia Wax	Aug. 20		" "
Early Mohawk	" 10		Good green. Late.
Early Six Weeks	July 28	Aug. 14	"
Black Butter			Runner. Late.
Lima Wax	Aug. 5		Small. Light cropper.
Experimental Farm Seed.			
Giant Dwarf Wax	Aug. 10		Good cropper.
Stringless Wax	" 25		" Late.
Early Six Weeks	July 16	Aug. 10	"
Flageólet Wax	Aug. 10	Sept. 1	Fair cropper.
Dwarf Triumph	" 15		" Good green.
Little Giant Wax	July 10	Sept. 1	Good cropper.
Golden Wax	" 10	" 1	Fair "
Challenge Black Wax	" 20	" 1	Best early.
Rust-proof Golden Wax	" 25		Good early.
Best of All	Aug. 16		Late.
Wardwell's Kidney Wax	July 25	Sept. 1	Good cropper.
Roger's Lima Wax	Aug. 15		Small crop green.
Refugee	" 15		" Late.
Bush Golden Wax	" 15		" "

BEETS.—Sown, April 27. Pulled, September 28.

Variety.	In use.	Bushels per acre.	Remarks.
Egyptian	July 12	1,225	Coarse.
Early Egyptian	" 12	1,225	"
Half-long Blood	Aug. 1	1,028	Good variety.
Early Blood Turnip	" 1	922	"
Early Eclipse	July 12	877	"
Dark Red Triumph	Aug. 12	862	Large.
Eclipse	July 12	710	Good variety.
New Improved Turnip	Aug. 1	700	"
Edmand's	July 12	665	"
Bon Secours Market	Aug. 1	635	Very good.
Dobbie's Selected Globe	July 12	544	"
Dobbie's New Purple	" 12	529	"
Extra Early	" 12	499	"
New Cardinal	" 12	378	Germination weak.
Long Dark Blood	Aug. 1	181	" "
Long Smooth Blood	" 1	90	" "

Garden Corn.—Planted, May 15.

Variety.	In use.	Ripe.	Remarks.
Mammoth White Cory	Sept. 5	Sept. 20	Best green.
Early Sugar	" 5	...	Did not mature.
Early Cory	" 5	Sept. 22	Good green.
Early Market	" 5	...	Did not mature.
Adam's Extra Early	Aug. 28	Sept. 22	Good green.
First of All	" 28	" 20	"
Crosby's Early	Sept. 5	" 22	"
Early Minnesota	" 5	...	Did not mature.
Mitchell's Extra Early	Aug. 28	Sept. 22	Good green.
Squaw	" 28	" 20	Early, fair crop.

Cabbage.

Sown in hot-house, March 27. Transplanted to cold-frame, April 11. Set out, May 14. Taken up October 3.

Variety.	In Use.	Weight.	Remarks.
		Lbs.	
Large Wakefield	Aug. 10	10	Good heads.
All Seasons	" 10	14	"
Mammoth Red Rock	...	9	Fair, solid.
Early Jersey Wakefield	Aug. 14	7	Small, solid.
Early Summer	" 20	9	Fair, split.
Selected Jersey Wakefield	July 25	9	Good heads.
Drumhead Savoy	Sept. 3	20	Large, soft, split.
Mammoth Drumhead	...	17	" solid.
Vandergaw	...	15	" "
Cluster Savoy	Sept. 1	9	Split badly.
First and Best	Aug. 28	7	Good heads.
Succession	" 25	10	"
Henderson's Early Summer	" 18	9	Small percentage good.
Henderson's Succession	" 24	9	Good heads.
Premier	" 24	9	"
Autumn King	...	13	Good, late.
St. Dennis	Sept. 3	10	"
Bruce's Winter	...	13	"
Red Drumhead,	...	10	"
The Lupton	...	20	Good, late, solid.
Marblehead Mammoth	Aug. 11	15	" solid.
Burpee's All Head	" 11	11	" "
New Extra Early Express	July 28	6	" early.
World-Beater	...	13	" late, solid.
All-Head	July 25	10	" early, split.
Improved American Savoy	...	11	Large, soft, split.

Cauliflower.

Sown in hot-house, March 27. Transplanted to cold-frame, April 11. Planted out May 14.

Variety.	In Use.	Weight.	Remarks.
		Lbs.	
Extra Early Paris	June 26..	6	Headed well. Good.
Autumn Giant	" 18..	6	Large, soft.
Autumn King	Aug. 16..	5	Small, solid.
Early Paris	July 14..	7	Large, soft.
Veitch's Autumn Giant	Aug. 25..	7	Very fine heads.
World's Best	June 26..	8	"
Gilt Edge	" 26..	10	"
Early Snowball	" 28..	7	"

Carrots.

Sown in open, April 13. Pulled, September 28.

Variety.	In use.	Bushels per Acre.	Remarks.
Danver's Half Long	July 19.	438	Small, smooth.
Half Long Stump Rooted	Aug. 1..	363	" "
Improved Danvers	" 10..	287	Medium "
Half Long Luc	" 10.	272	Small "
Half Long Scarlet	" 10..	272	" "
Early Scarlet Horn	July 19..	272	" rough.
Danver's	Aug. 1..	272	" smooth.
Chantenay	" 10..	257	" "
Danver's Half Long (Steele)	" 10..	211	" "
Scarlet Nantes	" 5..	136	" "

Celery.

Sown in hot-house, March 27. Transplanted to cold-frame, April 26. Transplanted to trench, June 5. Taken up, October 4.

Variety.	In use.	Height.	Weight.	Remarks.
		Feet.	Lbs.	
White Plume	Sept. 1..	2	2	Rusty, coarse.
Golden Rose	Oct. 4..	1½	2½	"
Turnip Rooted	" 4..	1½	4	"
Giant White Pascal	" 4..	1½	3½	"
Paris Golden Yellow	Sept. 20..	2	3	"
Giant White	Oct. 4..	1½	3	"
White Walnut	" 4..	2	2½	"
Dwarf White Winter	" 4..	2	3	"
New Rose	" 4..	1½	2½	"
Golden Heart	" 4..	2	2½	"
White Triumph	" 4.	1½	2	"
Rose Ribbed Paris	" 4..	1½	3	"

LETTUCE—Sown, April 27.

Variety.	In use.	Remarks.
Early Tennis Ball	June 15	Good.
Extra Early Self Folding	July 1	Extra fine.
Denver Market	June 17	"
New Sensation	" 17	"
Toronto Gem	" 16	"
Ohio Cabbage	" 21	"
Trianon	" 16	"
Big Boston	" 15	Large, good.
Nonpareil	" 17	Good.
Toronto Market	" 25	The best.
Golden Queen	" 20	Good.
Cream Butter	" 20	"
Green Paris Cos	" 25	Very large, good.
Prize Head	" 25	Good.
The Deacon	July 1	"
Gardener's Favorite	" 1	"
New York Market	" 1	"

ONIONS.

Sown in hot-house, March 27; transplanted, May 14; sown in open, April 13.

Variety.	Yield Transplanted.	Yield Sown in open.	Remarks.
	Bush.	Bush.	
Extra Early Red	317	287	Small; good.
Large Red Wethersfield	181	136	Large "
Yellow Dutch	90	60	Medium "
Small Silver Skin	66	60	Small "
White Globe	166	136	"
Extra Early Flat Red	212	196	Large.
Red Globe	......	105	Small.
Large Yellow Globe Danver's	212	242	Large; good.
Prize Taker	212	......	" "
Australian Brown	......	212	Small.
White Portugal	212	136	"
Large Yellow Flat Danver's	181	136	Large; good.

PEASE—Sown May 8.

Variety.	In use.	Ripe.	Remarks.
Improved Stratagem	July 28	Sept. 17	Large, late.
Premium Gem	Aug. 7	" 1	Medium, early.
Heroine	July 16	" 17	" late.
Alaska	" 10	Aug. 20	Small, early.
Rural New Yorker	" 7	" 20	" "
Best Extra Early	" 7	" 20	" "
Wm. Hurst	" 7	" 1	" "
Daisy	" 24	Sept. 17	Large, late.
First of All	" 7	Aug. 20	Small, early.
Gradus	" 11	Sept. 1	Large "
Prince of Wales	" 16	" 17	Medium, "
Ever-bearing	" 7	Aug. 1	" "

Variety.	In use.	Ripe.	Remarks.
Experimental Farm Seed—			
Stratagem	" 28..	Sept. 17..	Large, late.
Anticipation	Sept. 1..	" 15..	" "
Mott's Excelsior	July 7..	Aug. 20..	Small, early.
American Wonder	" 7..	" 20..	" "
Daisy	" 24..	Sept. 17..	Large, late.
C.P.R	Aug. 16..	" 11..	" "
First and Best	July 7..	Aug. 20..	Small, early.
Shropshire Hero	" 24..	Sept. 11..	Medium, late.
Yorkshire Hero	" 21..	" 11..	" "
Horsford's Market Garden	" 16..	" 15..	Small, early.
Laxton's Charmer	" 28..	" 17..	Large, late.
Burpee's Profusion	" 28..	" 11..	Medium, late.
Duke of Albany	" 14..	" 1..	" early.
Champion of England	" 28..	" 1..	" "
Telephone	" 7..	Aug. 20..	Large "
Heroine	" 16..	Sept. 17..	" late.
Admiral	" 14..	" 1.	Small, early.

SQUASH AND MARROWS.

Sown in hot-house, April 16 ; transplanted, May 14.

Variety.	Ripe.	Weight.	Remarks.
		Lbs.	
White Summer Crook Neck	Aug. 20..	2	Good. Prolific.
Early Yellow Bush Scallop	" 15..	8	" "
Mammoth Whale	" 27..	50	Very large and fine.
Vegetable Marrow	" 10..	6	Good.
English Marrow	" 10..	6	"
New Red Hubbard	" 15..	8	"
Mammoth White	" 27..	5	"
Long Island	" 15..	6	"
Long White Bush	" 20..	8	"

TOMATOES.

Sown in hot-house, March 28 ; transplanted to cold-frame, April 25 ; to garden, May 8.

Variety.	In Fruit.	1st Ripe.	Rough or Smooth.
Early Michigan	June 4....	June 24....	Smooth.
Atlantic Prize	" 1...	July 10....	"
Peach	" 25....	Aug. 17....	Rough.
Ponderosa	" 30....	" 20....	Smooth.
Early Ruby	" 2....	July 20....	Rough.
Yellow Plum	" 14....	" 27....	Smooth.
Red Cherry	" 7....	" 31....	"
Imperial	" 4....	Aug. 4 ...	Rough.
Stone	July 20....	" 14 ..	Smooth.
Earliest of All	June 4 ...	July 20....	Rough.
Dwarf Champion	July 7....	Aug. 31 ...	"
New Canada	June 30....	" 4....	Smooth.
Imperial	July 10....	" 4....	Rough.
Early Acme	June 25....	" 4....	"
Extra Early Red	" 10 ...	July 25....	Smooth.

PARSNIPS.

Sown April 28 ; lifted September 28.
Matchless.—166 bushels per acre. Very inferior.
Magnum Bonum.—150 bushels per acre. Very inferior.

PEPPERS.

Sown March 29 ; transplanted May 25.
Large Bell.—Good green, did not mature.
Japanses Cluster.—Good green, did not mature.

PUMPKINS.

Sown April 16 ; transplanted May 14.
Winter Luxury.—Ripe August 24 ; weight 7 pounds.
Connecticut Field.—Ripe August 24 ; weight 15 pounds.

HERBS.

Sown May 6.
Sage.—Good crop.
Summer Savory.—Good crop.
Cress.—Good crop.

SPINACH.

Sown May 6 ; produced a fair crop.

COFFEE-BERRY.

Sown May 29 ; ripe August 20 ; good crop.

CITRONS.

Sown April 9 ; set out May 14.
Colorado Preserving, Colorado, Red Seeded ; produced a poor crop of very small fruit.

TURNIPS.

Sown May 15; taken up September 28.
Golden Ball.—559 bushels per acre.
Early Snowball.—453 bushels per acre.

TOBACCO.

Sown March 29; transplanted May 25; in flower July 25; taken up September 11.
General Grant.—4 feet ; good crop.
Connecticut Seed Leaf.—4 feet ; good crop.

RHUBARB.

Victoria.—In use May 23 ; poor crop.
Linnæus.—In use May 23 ; poor crop.
Large Green.—In use May 23 ; poor crop.

New Seeding.

Sown April 26 ; transplanted June 18.

CUCUMBERS.

Sown in hot-house, April 9 ; re-potted, April 20 ; planted out, May 12.

Improved Long Green, Emerald, White Wonder, Albino, Short Green Gerkin, Prize Pickling, Giant Pera, English Favourite, Extra Early White Spine, White Pearl, Early Cluster, Early Frame, High Grade White Spine, Market Garden, Japanese Climbing, Improved White Spine, Early Siberian, Cool and Crisp, Chicago Pickling.

On account of dry weather all except Emerald were a complete failure. Emerald in use July 25.

RADISH.

Sown April 27.

Black Spanish, First Crop, White Olive, Rosy Gem, Earliest Carmine, Scarlet Olive (Bruce), New Crimson, White Olive (Steele), Scarlet Olive (Steele), White Tipped, Non Plus Ultra.

On account of dry weather the germination was very weak and the crop almost a failure.

KALE.

Sown in hot-house, March 27; transplanted, April 11; set out, May 14.

Grew very large and fine, but on account of drought in early part of season was late.

MUSK MELONS.

Sown April 9 ; transplanted May 14.

Exquisite, Earliest of All, Tip Top, The Banquet, Extra Early Netted Gem, Dominion Green Fleshed.

A very small crop of fruit set, which did not ripen.

WATER MELONS.

Sown April 9 ; transplanted May 14.

Cole's Early, McIvor's, Vick's Extra Early, Early Canada, Dixie, Black Spanish, Sugar.

No fruit set.

FLOWER GARDEN.

Late in the season flowers of all kinds made a good display, but until the rains came in July nothing did well.

Stocks, Verbenas, Asters, Candytuft, Zinnias and Petunias were very fine.

Perennials did not do as well as usual on account of the dry weather early in the season.

ANNUALS—Propagated in Hot-house.

Variety.	Sown.	Transplanted to Garden.	In Bloom.	Remarks.
Antirrhinum major	Mar. 28	May 25	July 26	Did not do well.
Abronia umbellata	" 29	" 25	" 15	" "
Amranthus rubra	" 29	" 25	June 5	Very fine show.
Arabis nana compacta	" 29	" 25	....	Did not flower.
ASTERS.				
Truffaut's Pæony Flowered	Mar. 26	May 25	July 15	Came in bloom very early on account of dry weather and were very inferior, but when rains came the second growth made a fine continuation of bloom, lasting till Sept. 15.
Pyramidal " "	" 26	" 25	" 15	
Globe " "	" 26	" 25	" 15	
Betteridge's Prize	" 26	" 25	" 20	
Quilled	" 26	" 25	" 20	
Imbricated Pompone	" 26	" 25	" 20	
Pæony-flowered Globe	" 26	" 25	" 20	
Balsam	" 26	" 23	June 10	Very fine.
Brachycome	" 28	" 23	July 10	"
Bachelor's Button	" 29	" 25	" 6	Did not do well.
Calliopsis, 2 varieties	" 27	" 22	June 16	Very fine.
Candytuft	" 27	" 25	" 12	Did well.
Coreopsis lanceolata	" 27	" 25	" 25	Flowered well.
Chrysanthemum, 5 varieties	" 27	" 23	" 28	A good display of bloom.
Convolvulus major	" 28	" 25	July 1	The few plants which grew were very fine.
Dianthus, 11 varieties	" 27	" 21	June 20	Did fairly well.
Dahlia	" 28	" 21	....	Did not flower.
Zinnia, 2 varieties	" 28	" 25	June 5	Bloomed freely.
Everlastings, 2 varieties	" 28	" 21	July 8	Did well. Color fine.
Gladiolus	" 28	" 25	Aug. 1	Too late.
Gaillardia, 3 varieties	" 27	" 25	July 4	Did well.
Lobelia, 2 varieties	" 27	June 22	" 21	"
Marigold, French, 2 varieties	" 27	May 21	June 6	Very fine display.
Petunia, 5 varieties	" 26	" 21	" 12	Bloom very large and fine, but few plants were double.
NASTURTIUM.				
Tom Thumb	April 10	May 2	June 16	Very fine; foliage large and dark; flowers large and abundant.
Dark Purple	" 10	" 2	" 16	
La Beaute	" 10	" 2	" 16	
Dark Scarlet	" 10	" 2	" 16	
Mixed	" 10	" 2	" 16	
Phlox Drummondii, 12 varieties	Mar. 26	" 21	" 12	Early flowers were very inferior, but second growth made fine show.
Portulaca, 2 varieties	" 27	April 16	" 12	Very fine.
Pyrethrum	" 29	May 21	July 20	Did fairly well.
Salpiglossis, 3 varieties	" 28	April 16	Aug. 10	Very few plants grew.
Stocks, 34 colours	" 26	May 21	June 10	First flowers small and inferior; bloom on second growth very fine, lasting till Sept. 1.
Sunflowers, 2 varieties	April 25	June 15	July 27	Very fine.
Verbenas, 2 varieties	Mar. 26	May 21	June 12	First flowers very inferior; second growth did well and produced good show, lasting till Sept. 15.
Ice Plant	" 28	" 25	... ...	Growth very strong: foliage fine.

ANNUALS—SOWN IN OPEN.

Variety.	Sown.	In bloom.	Remarks.
Dianthus	May 5	Sept. 1	Too late.
Eschscholtzia	" 5	July 6	Very fine.
Godetia, 2 varieties	" 5	Aug. 10	Did not do well.
Mignonette	" 5	July 10	Very inferior on account of dry weather.
Poppy, 5 varieties	" 5	" 24	Very fine display.
Sweet Pease, 3 varieties	" 5	" 28	On account of dry weather, almost a total failure, growth weak.

PERENNIALS.

Variety.	Sown.	Trans-planted.	In bloom.	Remarks.
Hollyhock, 5 plants		May 15.	July 10.	Did well. Colour very dark. Bloom large and abundant.
Linum	Mar. 28.	" 15.	" 16.	Did not do well.
Pansies:—				
Cassier's Large-flowered	" 27.	June 15.	" 20.	The pansies sown March 27, did not do well, but late in season the old bed made a fine show.
Prize Trimardeau	" 27	" 15.	" 20.	
Peacock	" 27	" 15.	" 20.	
Lorenz's Perfection	" 27.	" 15.	" 20.	
Exhibition prize	" 27.	" 15.	" 20.	Flowers large: colour and marking very fine.
Sweet William			June 10.	Old bed bloomed early and second growth made fine succession.
Everlasting Pea			July 15.	Made strong growth aad flowered freely.
Rudbeckia, Golden-glow			Aug. 15.	Didnot do as well as usual, on account of drought.

BULBS.

(Planted 1898-1899.)

Tulips.

On account of dry weather the flowering was irregular and the display not as fine as usual. There were, however, some very fine individual flowers. In bloom April 27.

Scilla sibirica.

In bloom April 20. Did fairly well.

Gladioli.

In bloom August 1. Some very fine specimens although many plants failed to flower.

Iris.

On account of dry weather the Iris made very unsatisfactory growth and very few blossomed until late in the season. A few plants came into bloom on June 8, but did not last long, and flowers were inferior.

PERENNIAL PHLOX.

The following varieties of Phlox were received from the central farm and planted in May, 1900 :—

Phlox decussata Figaro.
" " Amphion.
" " Etoile de Lyon.
" " Adonis.
" " Adam Brown.
" " A. Modsen.
" " Commissaire Gallet.
" " Lucile Baltet.
" " Clio.
" " *rubra splendens.*
" " Mad. Trotter.
" " Lucy Russell.
Phlox decussata Mons. Thuret.
" " Martha.
" " Jeanne d'Arc.
" " Sorpillum.
" " New Dwarf White.
" " Pantheon.
" *amœna.*
" *divaricata.*
" *reptans.*
" *pilosa.*
" *subulata lilacina.*

PAEONIES.

The following named varieties are under trial and promise well. They were received from the Central Farm early in May, 1900 :—

Pæonia sinensis Faust.
" " Arthur.
" " Oliver.
" " Thorbecki.
" " Auguste de Hour.
" " Souvenir de l'Exp. Universelle.
" " Caroline Alain.
" " Mons. de Villeneuve.
" " *Lilacina Superba.*
" " *Albiflora Thorbecki.*
" " *Officinalis Mutabilis.*
" " Professor Morren.
" " *Festiva Maxima.*
" " De Candolle.
" " Rose of Gentbrugge.
" " *Tri-color Grandiflora.*
" " *Mutabilis.*
Pæonia sinensis Heckla.
" " *Rubicunda alba Marg.*
" " *Rubra plenissima.*
" " *Festiva.*
" " *Pulcherrima.*
" " Duchesse d'Orleans.
" " *alba-plena.*
" " Auguste Mueller.
" " Ambroise Verschaffelt.
" " Bruante Françoise.
" " *atro-rubens.*
" " Prosper d'Aurenberg.
" " L'Eclatante.
" " Faubert.
" " Prince de Salm Dyck.
" *tenuifolia fl. pl.*

IRIS.

The following varieties of Iris have been received from the Central Farm and are making fair growth :—

Iris amœna Crebillon.
" " Mrs. H. Darwin.
" " Julia Grisi.
" " Maria Theresa.
" " Victor Lemoine.
" *aurea.*
" *Balkana.*
" *biflora.*
" *biglumis.*
" *Blondovi.*
" *cristata.*
" *chamœiris.*
" *ensata.*
" *flavescens.*
" *florentina.*
" *furcata.*
" *Germanica.*
" " Asiatica.
" " Verschuur.
" *gigantea.*
" *goldenstadtiana cœrulescens.*
" *Hungarica.*
" *neglecta* Agathe.
" " Arlequin Milanais.
" " *Hericartiana.*
" " Sappho.
" *nudicaulis.*
" *orientalis.*
" *oxypetala.*
" *pallida.*
" " *cengialti.*
" *plicata* Gisela.
" " Lord Seymour.
" " Reine des Belges.
Iris plicata Swertii.
" *prismatica.*
" *pumila.*
" " *cinerea.*
" " *gracilis.*
" " *lutea.*
" *ruthenica.*
" *sibirica.*
" " *alba.*
" " *hœmatophylla.*
" " *violacea.*
" *squalens.*
" " Bronze Stoffels.
" " Dina.
" " Haydee.
" " Hector.
" " La Marmora.
" " La Tristesse.
" " Minerva.
" " Tarquin.
" *variegata.*
" " *Arguinto.*
" " Coquette.
" " Darius.
" " Gracchus.
" " Henry Havard.
" " Honorabile.
" " Innocenza.
" " Minos.
" " Munico.
" " *pancrace.*
" " Samson.
" " Souvenir.
" *virescens.*

SPIRAEA.

The following varieties of herbaceous spiraeas have been received from the Central Farm and are doing well :—

Spiræa aruncus.
" *digitata glabra.*
" *filipendula.*
" " *fl. pl.*
" *kamschatica.*
" *palmata.*
Spiræa palmata elegans.
" *pubescens.*
" *ulmaria.*
" " *fl. pl.*
" *venusta.*
" " *pallida.*

SUNDRY PERENNIALS.

Increasing interest is felt from year to year in hardy perennial plants. In the following list are many old favourits and a number of newer sorts hitherto untried here. A large proportion of these were sent to Indian Head for test from the Central Farm this year. Most of them are now fairly well established, and if they prove hardy in this climate may be expected to bloom next year.

Anthemis tinctoria Kelwayi.
Achillea millefolium rubrum.
" Sibirica Blush.
" Sibirica white.
" *Ptarmica fl. pl.*
Acorus spurius.
Asarum Canadense.
Ajuga reptans atropurpurea.
" *Genevensis.*
Aethionema coridifolium.
Aster Novae Angliae roseus.
" " Newry seedling.
" " Top Sawyer.
" " W. Bowman.
" " White Queen.
Asclepias tuberosa.
Aconitum pyrenaicum.
" *Kuzmalowii.*
Anemone Narcissiflora.
Artemisia stellerianum.
Boltonia latisquama.
" *asteroides.*
Cotoneaster verticillata.
Chelone Lyoni.
" *barbata.*
Clematis recta.
Coreopsis delphinifolia.
Centaurea montana alba.
" *macrocephala.*
Campanula turbinata.
" *Rainerii.*
" *Glomerata Dahurica.*
" *Americana.*
" *Asiatica.*
" *persicæfolia grandiflora.*
Doronicum Clusii.
" *Caucasicum.*
" *plantagineum excelsum.*
Erigeron macranthus.
Epimedium muscheanum rubrum.
" *rubrum.*
Funkia univittata.
" *lancifolia.*
" *Sieboldiana.*
Geranium maculatum.
Geranium Wilfordi.
" *sanguineum.*
" *platypetalum.*
Geum triflorum.
Helenium grande striatum.
Heuchera sanginea.
Hemerocallis Dumortieri.
" *fulva.*
" *Kwanso fl. pl.*
" *variegata fl. pl.*
" *Middendorfii.*
" *disticha fl. pl.*
" *graminifolia.*
Helianthus Maximiliana.
" *giganteus.*
" *autumnale.*
Lupinus polyphyllus.
Lilium superbum.
Lysimachia nummularifolia.
" *punctata.*
" *clethroides.*
Monarda didyma.
Poterium officinale.
Pyrethrum uliginosum.
Phlomis fruticosum.
Potentilla hybrida versicolor.
Phalaris arundinacea fol. var.
Physostegia Virginica alba.
Rudbeckia laciniata.
Sempervivum Montanum.
" *Boulicianum.*
Symphytum asperrimum.
Sidalcea candida.
Senecio alba balsamitae.
Solidago Missouriensis.
" *gigantea.*
" *rigida.*
Thermopsis fabacea.
" *Caroliniana.*
Tradescantia Virginica alba.
" *Virginica coerulea.*
Valeriana officinalis.
Veronica spicata.
" *Virginica.*
" *elegans carnea.*

CANNAS.

Dry weather injured the plants and not many of them flowered. A few, however, produced some very good blooms. The following varieties are under test :—

Austria.
Allemania.
Aphrodite.
Asia.
Burbank.
Baron de Poilly.
C. Bernardin.
Comte de Bouchard.
Explorateur Campbell.
Florence Vaughan.

Furst Bismark.
Graf Oswald de Kerchove.
Hortense Barbereau.
J. D. Eisle.
Madagascar.
M. Crozy.
Paul Lorenz.
President Cleveland.
Roi des Rouges.

DAHLIAS.

These were in bloom July 1, but dry weather injured the plants and spoiled the bloom. A second growth made after the rains came was just coming into bloom when the plants were frozen September 13. The following varieties were tested :—

Bird of Passage.
Cochineal.
Chairman.
Crimson Beauty.
Cactus Queen.
Constance.
Clifford W. Bruton.
Fairy Queen.
Gem.
Hector.
Herbert Turner.
Herbert.
John Sladden.
Lyndhurst.
Lady Antrobus.
Liliputian.
Little Pigmy.
Mantas la Villa.
Mrs. Peart.
Mrs. Langtry.
Nemesis.
Perfect Vallose.
Sambo.
Snow-clad.
Victory.
Woman-in-white.
Wm. Agnew.

TREES AND SHRUBS.

On the whole, trees and shrubs made satisfactory progress during the past season.

An unusually early start was made in the spring, and the chance for a large growth was a good one. In June, however, dry weather and terribly hot winds checked the progress and threatened to cause serious loss, but the heavy rains in the early part of July effected a wonderful change and before the end of the season about one-half the usual growth had been attained.

Frost in September caught everything in full leaf, with wood far from matured and in bad condition to stand a hard winter.

The winter of 1899 was very favourable for trees and shrubs, and all well established varieties came through safely.

NEW PLANTATIONS.

In May about one-third of a mile on the east side of the farm was planted with Box-elder (*Acer Negundo*) for a hedge. Hardly a single tree stood the dry weather following, and the whole row will have to be re-planted.

FOREST PLANTATION.

The Box-elder (*Acer Negundo*), Elm (*Ulmus Americana*), Ash (*Fraxinus Viridis*), and Sand-cherry, in forest plantation, described in last report, made satisfactory progress. The trees are now shading the ground, and in future very little work will be required to keep down the weeds.

ARBORETUM.

The arboretum now contains 358 species and varieties of trees and shrubs, which have been planted as follows :—

In 1895, 41 varieties ; in 1896, 62 varieties, of which 6 replaced deaths in 1895 ; in 1897, 75 varieties, of which 2 replaced deaths in 1896 ; in 1898, 62 varieties, of which 5 replaced deaths of 1897 ; in 1899, 163 varieties, of which 22 replaced deaths of 1898 ; in 1900, 37 varieties, all of which replaced deaths of 1899.

HEDGES.

The hedges around the fruit plantations and vegetable gardens were somewhat injured by the dry weather and hot winds in June, but had quite recovered by the end of the season. The leaves remained on till frozen about the middle of September.

SAMPLE HEDGES.

All the sample hedges did well this year, and the plantation was a source of much interest to visitors.

ROSES.

The rose bushes, planted in 1899, did not make much progress. A few bushes flowered early in the season, but all were affected by dry weather, and it is feared that the second growth, which was made after the rains commenced in July, will suffer during the coming winter.

FRUIT TREES AND BUSHES.

In no year since the farm started have the small fruits promised so well and resulted in such an entire failure, as in the season just passed.

Currants of all sorts, gooseberries, raspberries and strawberries came through the winter perfectly, and starting early, with no spring frost to injure them, made a fine showing. A hot wind, however, caught the gooseberries and strawberries in blossom and completely destroyed all chance of a crop. Currants and raspberries, at this time, were further advanced and escaped injury, only to have their immense crops of fruit completely cooked by the excessively hot winds of June 21, 22 and 23. A small quantity of fruit on the under side of the bushes escaped, but was of little use, as it was too badly dried up to be worth picking.

SEEDLING APPLES.

Two seedlings of Arctic and Tonka, planted in 1899, did not winter-kill, and made fair growth during the season.

This spring six trees of Hibernal, six trees of Blushed Calville and six trees of Wealthy were planted in a well sheltered inclosure.

CRAB APPLES *(Pyrus baccata).*

The trees planted in 1896, in one of the inclosures, came through the winter in excellent condition, and made fair growth during the season. No winter-killing took place, and growth commenced early in April. From May 5 to 10, seven trees that bore fruit last season came in blossom, and thirty blossomed for the first time. The fruit ripened from August 20 to September 1, and in every case was the finest so far produced on the farm.

As the condition of the plantation is practically the same as last year, it is not considered necessary to report on the growth and hardiness of the different varieties. The following notes on their fruiting is submitted :—

Received from Central Experimental Farm, Ottawa.—Planted 1896.

Pyrus baccata macrocarpa—

Tree No. 1.—Bloom, May 5. Ripe, August 25. Light crop. Size of choke-cherry. Red.

Tree No. 2.—Bloom, May 5. Ripe, August 20. Heavy crop. Size of choke-cherry. Red. Very astringent.

Pyrus baccata cerasiformis—

Tree No. 1.—Bloom, May 5. Ripe, August 25. Light crop, very small, red fruit, very astringent.

Tree No. 2.—Bloom, May 5. Ripe, August 25. Heavy crop, small, red, astringent fruit.

Tree No. 3.—Bloom, May 10. Ripe, September 1. Light crop, small, red, astringent fruit.

Pyrus baccata genuina—

Tree No. 1.—Bloom, May 5. Ripe, August 25. Light crop, small, red, astringent fruit.

Tree No. 2.—Bloom, May 10. Ripe, September 1. Light crop, small, red and yellow, astringent fruit.

Tree No. 3.—Bloom, May 5. Ripe, September 1. Heavy crop, size of *baccata*, pale red. Astringent.

Tree No. 4.—Bloom, May 5. Ripe, September 5. Light crop, small, yellow, good flavour.

Tree No. 5.—Bloom, May 5. Ripe, August 25. Good crop, large, flat, yellow, cheek. Good flavour. The largest grown this year.

SEEDLINGS RAISED AT INDIAN HEAD.

(Planted 1896.)

Pyrus baccata genuina—

Tree No. 1.—Bloom, May 5. Ripe, September 1. Light crop, small, red, slightly astringent fruit.

Tree No. 2.—Bloom, May 5. Ripe, September 1. Very light crop, small, red, astringent fruit.

Pyrus baccata cerasiformis—

Tree No. 1.—Bloom, May 5. Ripe, August 20. Good crop, large, red and yellow fruit. Excellent flavour. One of the best.

Tree No. 2.—Bloom, May 5. Ripe, September 1. Light crop, small red, astringent.

Tree No. 3.—Bloom, May 10. Ripe, September 1. Light crop, size of choke-cherry, red. Slightly astringent.

Tree No. 4.—Bloom May 10. Ripe September 1. Light crop, small, astringent fruit.

Tree No. 5.—Bloom May 10. Ripe September 1. Good crop, small astringent fruit.

Tree No. 6.—Bloom May 10. Ripe September 1. Good crop, size of cherry, yellow and red. Good flavour.

Tree No. 7.—Bloom May 5. Ripe September 1. Light crop, size of cherry, sour.

Pyrus baccata macrocarpa—

Tree No. 1.—Bloom May 5. Ripe August 20. Good crop, size of choke-cherry, yellow and red. Good flavour.

Tree No. 2.—Bloom May 10. Ripe August 25. Fair crop, size of cherry, yellow and red. Very sour.

Tree No. 3.—Bloom May 5. Ripe August 25. Good crop, size of small cherry, red, good flavour.

Tree No. 4.—Bloom May 5. Ripe September 1. Good crop, size of small cherry. red, good flavour.

Pyrus baccata macrocarpa—Con.

Tree No. 5.—Bloom May 5. Ripe September 1. Light crop, size of choke-cherry, red, very astringent.
Tree No. 6.—Bloom May 5. Ripe August 25. Light crop, larger and flatter than *baccata*. Yellow, red cheek, good flavour.
Tree No. 7.—Bloom May 10. Ripe September 1. Light crop, large, flat yellow, good.

Pyrus prunifolia—

Tree No. 1.—Bloom May 5. Ripe August 20. Light crop, small fruit.
Tree No. 2.—Bloom May 5. Ripe August 20. Light crop, small, red, good flavour.
Tree No. 3.—Bloom May 10. Ripe September 1. Light crop, size of large cherry, flat, yellow and red, good flavour.
Tree No. 4.—Bloom May 10. Ripe September 1. Light crop, small, red.
Tree No. 5.—Bloom May 10. Ripe August 25. Very heavy crop, size of *baccata*, bright red, very astringent.
Tree No. 6.—Bloom May 5. Ripe August 25 . Light crop, small, pale red.

Pyrus baccata sanguinea—

Tree No. 1.—Bloom May 5. Ripe August 20. Light crop, very small, red.
Tree No. 2.—Bloom May 5. Ripe August 20. Light crop,, small, yellow.
Tree No. 3.—Bloom May 10. Ripe September 1. Light crop, small, red.
Tree No. 4.—Bloom May 5. Ripe August 25. Very heavy crop, size of small cherry, red, good flavour.

From the above notes it will be seen that these wild forms of Siberian crab do not reproduce themselves from seed truly, but vary very much in the size and quality of their fruit. Their hardiness in the North-west is now fully established, and from their improvement by selection and top grafting of the poorer sorts with the better kinds, some useful fruits will no doubt be obtained. The prospects are still brighter for future apple production here from the new cross-bred sorts produced at Ottawa, which are much larger, and as far as they have been tested most of them seem to be hardy.

HYBRID CRABS.

(Planted 1898-99.)

The surviving root-grafts and cross-bred seedlings which have been growing in plum and pyrus orchard west of the superintendent's house since 1898-99 were this spring removed to an inclosure near the Arboretum and set out with hybrid crabs received from the Central Experimental Farm.

The number of each variety is as follows :—

Root-grafts.

No. 165, 2 trees ; No. 16, 1 tree ; No. 30, 1 tree ; No. 107, 1 tree ; No. 122, 3 trees ; No. 164, 2 trees ; No. 79, 1 tree ; No. 162, 1 tree ; No. 19, 1 tree ; No. 53, 1 tree ; No. 142, 1 tree ; No. 125, 1 tree ; No. 163, 1 tree ; No. 64, 1 tree ; No. 161, 1 tree.

Cross-bred Seedlings.

No. 96, 6 trees ; No. 95, 6 trees ; No. 51, 1 tree.

Very little progress was made during the growing season and several of the varieties succumbed during the hot weather of June and July.

HYBRID CRABS.

(Planted 1900.)

On April 27 six each of five of the most promising varieties of hybrid crabs, recently produced at the Central Experimental Farm, Ottawa, and which are expected to prove hardy in the North-west, were received and planted in a well sheltered. inclosure.

The ground for about a foot on each side of the graft was at once mulched with 2 inches of well-rotted manure to keep the earth moist. They have made fairly good progress considering the unfavourable character of the season.

PLUMS.

Seedlings of Hungarian—Planted, 1894.—Winter-killed considerably and did not make much progress this season. Did not blossom. A second growth was made in July and August, which has not thoroughly matured, and it is feared that these and other plums will suffer during the coming winter.

Seedling of Speer—Planted, 1895.—Slightly winter-killed. Made fair growth. Did not blossom.

Seedling of De Soto—Planted, 1895.—Living at tips, spring, 1900. Fair growth during the season. Did not blossom.

Seedlings of Voronesh—Planted, 1895.—Killed at tips. Fair growth. Did not blossom.

Seedlings of Imperial Blue—Planted, 1895.—Winter-killed at tips. Strong growth. Did not blossom.

Seedlings of Weaver—Planted, 1894.—Nearly all of the trees in this plantation came through the winter in good condition, less than one-third showing any signs of winter-killing. Twenty-nine trees blossomed, of which 25 bore fruit. In blossom May 12. Ripe from August 25 to September 5. Five of the trees produced an excellent quality of fruit and four trees of the five bore a very heavy crop. The fruit ripened evenly and when preserved was of good flavour and texture.

PLUMS FROM C. E. FARM, OTTAWA.

Aikin Plum—Planted, 1897.—Came through the winter in good condition and blossomed freely on May 12. A large crop of fruit set and ripened. The plums were the largest grown on the farm this year, and were of excellent quality and flavour ; colour, deep red, skin thin, ripe August 25. Since this plum was planted in 1897, it has made steady progress and now promises to be a valuable variety for the North-west. The tree which fruited was planted in one of the hedge inclosures, where it was well sheltered.

PLUMS RECEIVED FROM CHARLES LUEDLOFF, COLOGNE, MINN., U.S.A.

Planted, 1896.—Of the 38 varieties of American plum seedlings living last fall, all came through the winter, although a number of the varieties were more or less killed back.

Cottrell, Weaver, Van Deman, Peffer's Premium, Wood, and Ocheeda, blossomed in May, but no fruit set.

City—Blossomed May 10.—Fair crop. Large fruit, good quality. Ripe, September 1.

Large Red sweet—Blossomed, May 10.—Light crop. Large fruit, fair quality, late. Ripe, September 15.

Dunlap, No. 1—Blossomed, May 15.—Fair crop. Medium sized fruit. Did not ripen.

New Ulm—Blossomed May 5.—Light crop. Very large and fine fruit of excellent flavour. Ripe, September 10. This variety has been fairly hardy and is likely to prove a useful plum for cultivation in the North-west.

Purple Yosemite—Blossomed, May 20.—Light crop. Medium sized fruit. Did not ripen.

MANITOBA NATIVE PLUMS—FROM THOS. FRANKLAND, STONEWALL, MAN.

Of the 35 numbered varieties reported living last fall, two died during the winter, and the others, with the exception of 18 varieties, were more or less killed back.

FRUITING.

Number	Name of Variety.	Crop.	Size.	Colour.	Flavour.	Ripe.
60	Yellow Sweet	Heavy	Large	Yellow	Medium	Sept. 1.
7	Saskatchewan	"	Medium	Red	Excellent	Aug. 20.
51	Arctic	Light	Large			Late.
69	Pasqua	"	"			"
89	Laurie	Fair	Small	Red		"
67	Eva	Heavy	"	"	Excellent	Sept. 10.

Seedlings Raised at Indian Head—Transplanted, Spring, 1895.—Came through the winter in good condition, and blossomed May 10 to 20.

Following are notes on their fruiting :—

Name.	Crop.	Size.	Colour.	Flavour.	Skin.	Ripe.
Chinook	Heavy	Medium	Red			Aug. 25
Allie	"	"	"	Good	Thin	" 25
Bedford	Light	"				
Prairie Rose	Heavy	"	Red	Good	Thick	Aug. 25
Dawson City	Fair	"				
First Sweet	Heavy	"	Red	Excellent	Thin	" 20
Regina	"	Small	"	Good	Thick	" 20
Souris	"	Medium	"	Fair	"	" 20
Ruby	"	Small	"	Sour	"	" 30
Charmer	Light	Large	"	Bitter		" 20
Victor	"	Medium	"			" 25
La Rouge	Heavy	"	Red	Good	Thick	" 25
Yellow Sweet	"	Large	Yellow	Fair	Thin	Sept. 1
Yukon	"	Medium	Red	Good	Thick	Aug. 25
Alberta	Fair	Large				" 25
Assiniboia	Small	Medium				" 25
Fin de Siecle	Heavy	Large	Red	Fair	Thick	" 25

CHERRIES.

Seedling of Carnation.—Planted 1894.—Winter-killed one-half. Fair growth during season.

Seedling of Lithaur Weichsel—Planted 1894.—Came through the winter in fairly good condition. One tree blossomed but did not bear fruit.

Mahaleb—Planted 1895.—Killed one-half. Made good growth this season.

Seedling of Olivet—Planted 1895.—Winter killed back one-half. Made fair growth during season.

Seedlings of Minnesota Ostheim—Planted 1895.—Considerably winter-killed, and on account of dry weather early in the season did not make satisfactory growth.

Seedlings of Wild Cherry from Nebraska, U.S.A.—Planted 1896.—Winter-killed at tips. Made slow progress during season and did not fruit.

Rocky Mountain Cherry—Planted 1895.—Hardy. Fruiting lightly. Fruit small on account of dry weather.

Prunus Pumila—Hardy. Fruiting lightly, and on account of dry weather the fruit was small and dried up.

APRICOTS.

Two trees from Turkestan. Winter-killed at tips. Fair growth during season.

SMALL FRUITS.

The extremely hot weather just at the time the small fruits were beginning to mature almost completely destroyed the crop, and in consequence it is not considered necessary to report on the fruiting of each variety.

WHITE CURRANTS.

White Grape, White Dutch, White Transparent and White Imperial. Hardy. Fair growth during the season.

RED CURRANTS.

Fay's Prolific, Raby Castle, Red Dutch, La Conde, Knight's Early Red, New Red Dutch, Native Red, London Red, Victoria, Fertile d'Angers, Cherry, Prince Albert, La Fertile, Versaillaise, North Star, Pomona and Wilder. Came through the winter in good condition. Large crop fruit set. Dried up. Growth fair.

BLACK CURRANTS.

Lee's Prolific, Black Naples, Prince of Wales, Crandall. Saunders' Seedlings : Stewart, Clipper, Orton. Kerry, Eagle, Monarch, Charmer, Beauty, Winona, Ontario, Standard, Lewis, Ethel, Stirling, Star, Madoc, Perry, Eclipse, Oxford, Climax, wintered in good condition. A very heavy crop of fruit set, but was destroyed by heat. The bushes made a strong growth late in the season.

RASPBERRIES.

Dr. Reider, Philadelphia, Turner, Caroline, Lady Anne, Garfield, Miller's Red and Kenyon, wintered in excellent condition and set a large crop of fruit, which was completely destroyed by heat.

BLACK-CAP RASPBERRIES.

Wintered well. A large crop of fruit set, but was destroyed by heat.

GOOSEBERRIES.

Smith's Improved, Lancashire Lad, Governess, Columbus, Houghton, Native, Pearl and Keepsake. Heavy crop of fruit set, but they ripened prematurely and were of no value.

STRAWBERRIES.

Capt. Jack, New Dominion, Windsor Chief and Pine-apple wintered fairly well, but the crop was very light.

Planted 1900.—Twelve each of St. Joseph and Jean d'Arc (everblooming).

CATTLE.

The herd on the farm at present consists of:—One pure bred Shorthorn bull and eleven females ; one pure bred Ayrshire bull ; one pure bred Guernsey bull ; four grade Ayrshires ; two grade Holsteins ; one grade Polled Angus, and eleven grade Durhams; in addition to which, sixteen grade steers have been purchased for use in a dehorning test, to be carried on during the winter.

Since last report the 3-year old Holstein bull 'Earl of Edgeley 2nd' has been sold, the yearling Durham 'General Kitchener' sent to the experimental farm at Agassiz, British Columbia, and the yearling Durham 'Lord Roberts' sold for breeding purposes.

TEST OF DEHORNING STEERS.

During the winter of 1899 and 1900, fifteen 3-year old grade steers were obtained from Messrs. Gordon & Ironside, of Winnipeg, Man., for use in a test of the practicability of dehorning.

On November 29, after a preparatory feeding of twenty days, a 16-weeks test was commenced to determine :—1st. What loss, if any, is occasioned by the process of dehorning, and 2nd. If feeding loose in a box stall, rendered possible by dehorning, has any advantage over stall-feeding.

On the above date, the fifteen animals were divided into three lots of approximately equal weight :—

Lot No. 1.—Five steers, left in a natural state and tied up.

Lot No. 2.—Five steers, dehorned (by sawing off horns with a small hand-saw) and tied up, and

Lot No. 3.—Five steers, dehorned (by the same method as above) and put in a loose box.

The three lots received a uniform ration throughout the test, which consisted of :—

During first four weeks. Each animal per day—

	Pounds.
Ensilage	16
Straw (barley and oat)	15
Meal	6

During second four weeks. Each animal per day—

	Pounds.
Ensilage	16
Straw (barley and oat)	15
Meal	6

During third four weeks. Each animal per day—

	Pounds.
Ensilage	16
Straw (barley and oat)	15
Hay	8
Meal	6

During fourth four weeks. Each animal per day—

	Pounds.
Ensilage	16
Straw (barley and oat)	15
Hay	10
Meal	10

The hay and straw were cut, and the meal consisted of two parts of ground barley to one part of ground wheat. The steers were fed three times daily, and watered once.

From four to six days after dehorning, no effect of the operation was noticeable on the animals. but after that time they all went off their feed, were dull and apparently very sick, which condition lasted for about one week. In most cases the recovery was rapid ; one animal, however, became very sick, and did not entirely get over the operation for about three weeks.

When the test was concluded, the animals were left where they were, and fed a heavier ration till May 9, when they were delivered to Messrs. Gordon & Ironside, who paid 8 cents per pound for the increase in weight.

Following will be found a statement of the monthly and total weights and gains of each lot of steers during the period of the test ; weights and gains made by the bunch during the whole period (November 10 to May 9) ; the total amount and estimated value of feed consumed during the same time, and a summary of the financial results of the transaction :—

MONTHLY and total Weights and Gains of each lot of Steers, during period of Test.

Lot.	Weight at start of Test.	1st 4 WEEKS.		2nd 4 WEEKS.		3rd 4 WEEKS.		4th 4 WEEKS.		Total Gain.
		Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	Weight.	Gain.	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Number 1....	6,220	6,330	110	6,900	270	7,170	270	7,290	120	770
" 2....	6,250	6,390	140	6,750	360	6,990	240	7,160	170	910
" 3...	6,385	6,710	325	6,860	150	7,120	260	7,280	160	895

WEIGHTS and gains made by the bunch, during the whole period. November 10, May 9.

Lot	Weight when taken from exporter, November 10.	Weight when lifted by Exporter, May 9.	Gain.
	Lbs.	Lbs.	Lbs.
Number 1..................	6,580	7,750	1,170
" 2..................	6,525	7,930	1,405
" 3..................	6,565	7,740	1,175
Total..................	19,670	23,420	3,750

TOTAL weight and estimated value of feed consumed during the whole period.
During the preparatory feeding. Each lot (5 steers) 20 days—

Ensilage, 16 lbs. per day, 1,600 lbs. at $2..............	$1 60
Straw, 15 lbs. per day, 1,500 lbs. at $1..............	0 75
Meal, 4 lbs. per day, 40 lbs. at ⅔ cent..................	2 66
	$5 01

Or for three lots, $15.03.

During test (112 days), each lot—

Ensilage, 8,960 lbs. at $2	$8 96
Straw, 8,400 lbs. at $1	4 20
Hay, 2,550 lbs. at $5	6 37
Meal, 3,920 lbs. at ⅔ cents	26 13
	$45 66

Or for three lots, $136.98.

From end of test till lifted by exporter (43 days), each lot—

Ensilage, 16 lbs. per day, 3,440 lbs. at $2	$3 44
Straw, 10 lbs. per day, 2,150 lbs. at $1	1 07
Hay, 15 lbs. per day, 3,225 lbs. at $5	8 06
Meal, 12 lbs. per day, 2,580 lbs. at ⅔ cents	17 20
	$29 77

Or for three lots, $89.31.

Summary of Cost of Feeding.

During preparatory feeding	$ 15 03
During test	136 98
Till lifted	89 31
	$241 32

Or for each lot of 5 steers, $80.44.

SUMMARY OF FINANCIAL RESULT OF TRANSACTION

Lot No.	Value of Feed Consumed, as per Summary.	Gain in Pounds.	At	Amount.	Net Gain. Each Lot.	Average Net Gain. Per Head.
	$ cts.		Cts.	$ ts.	$ cts.	$ cts.
No. 1	80 44	1,170	8	93 60	13 16	2 63
No. 2	80 44	1,405	8	112 40	31 96	6 39
No. 3	80 44	1,175	8	94 ..	13 56	2 71
		3,750	8	300 00		

Or an average net gain per head on all of $3.91.

SWINE.

The herd on the farm at present consists of :—

Berkshires, 2 boars, 2 sows.
Tamworths, 1 boar, 1 sow.

Since last report, four Berkshire boars and two sows have been sold to farmers for breeding purposes ; five old animals sold for pork and one Tamworth sow exchanged.

POULTRY.

On account of the difficulty experienced in keeping the different breeds separate, the flock on the farm has been reduced to White Wyandottes and Black Minorcas, the flocks of which consist of :—

White Wyandottes, 10 birds.
Black Minorcas, 72 birds.

HORSES.

Since my last report, I have to advise the loss of two horses, one of which died in July and the other was shot in November. The former was one of our brood mares and was sick with inflammation for only a few hours. The latter was one of the horses brought from Ontario when the farm started, and through old age was incapacitated for work.

With the young animals on hand to take their places, there will be sufficient to do the work without purchase.

BEES.

I regret being unable to report any success in bee culture. One swarm was put in winter quarters in November. 1899, in a vacant room in the Superintendent's house, and was returned there in November of the present year. A swarm came off in July but returned to hive almost immediately. This was the only attempt at swarming made during the season. The weight of the hive when taken into the house in November, 1899, was 45 pounds ; this year it was 37 pounds, and no honey whatever had been taken from it during the year.

SUMMER-FALLOWS.

In view of the fact that the crops on fallowed land, except where injured by winds, were fairly good this year, notwithstanding the unfavourableness of the season, and that the crop on stubble was almost a complete failure, it is perhaps advisable in this report, to refer to the various methods which have been employed in making fallows on this farm, and to the results obtained therefrom.

First Method.—Ploughed deep (6 to 8 inches) before last of June ; surface cultivated during the growing season, and just before or immediately after harvest, ploughed 5 to 6 inches deep.

Result.—Too much late growth if season was at all wet ; grain late in ripening, and a large crop of weeds if grain was in any way injured by winds.

Second Method.—Ploughed shallow (3 inches deep) before last of June ; surface cultivated during growing season, and ploughed shallow (3 to 4 inches deep) in autumn.

Result.—Poor crop in a dry year ; medium crop in a wet year. Not sufficiently stirred to enable soil to retain moisture.

Third Method.—Ploughed shallow (3 inches) before last of June ; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year. (The crop on the farm destroyed by winds and dry weather this year was on land worked in this way. The soil was too loose, dried out too easily and was blown away.)

Fourth Method.—Ploughed deep (7 to 8 inches) before last of June, and surface cultivated during the growing season.

Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past 13 years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results ; and the plan too frequently followed of waiting till weeds are full grown, and often fully ripe, and ploughing under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture into the soil. The rain must fall on the first ploughing, and be conserved by surface cultivation.

Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousand fold to the myriads already in the soil, and does not materially enrich the land.

SEEDING TO BROME OR WESTERN RYE GRASS TO PREVENT DRIFTING OF SOIL.

On this farm, during the past season, nothing was more apparent than the advantage of having grass-roots in the soil to prevent drifting by the high winds that prevailed at that time.

While the top-soil of fallowed fields was, day after day, being carried away in clouds and the crops dying by inches, the land containing grass-roots was not in any way disturbed, and the injury done to crops was by dry weather alone.

One field had been under Brome grass for five years, was broken in June, and back-set in August, 1899. Another field of rye grass and a mixture of Alsike clover, Lucerne and Brome grass was broken and back-set during the same months, and both were worked quite fine before the seed was sown.

PROTECTION OF GRAIN BY HEDGES.

The various hedges on the farm did good service in protecting the crops from winds, although it so happened that the grain crops were chiefly on fields surrounded by the younger hedges ; otherwise, little or no injury would have been done the grain, notwithstanding the prevalence and severity of the spring winds.

It was found by measurements that for every foot in height, a hedge protects from 50 to 60 feet in width of crop. From 60 to 80 feet the grain was more or less injured, and outside this distance it was completely killed.

INSTITUTE MEETINGS.

During the month of July, I had the pleasure of attending a series of agricultural or institute meetings in Saskatchewan, arranged by the Commissioner of Agriculture for the North-west Territories.

The Commissioner, Mr. G. H. V. Bulyea, Dr. Fletcher, Entomologist and Botanist Experimental Farms, Ottawa, and Mr. Blakeley, representing the *Nor-west Farmer*, of Winnipeg, took part in the meetings.

The first was held at Prince Albert. From there we drove eastward through a magnificent grain and dairying country, and held a meeting at McDowall's school-house. Thence, south-east to Melfort, a distance of sixty miles by trail, the first half of which was through an excellent grazing country, and the other half through one of the finest mixed farming districts I have visited in any of the Territories. The meeting at Melfort was like the country surrounding it, satisfactory in every respect.

Retracing our steps for twenty miles, a meeting was held at Kinistino, the centre of another fine district, in which large herds of cattle, rolling in fat, were everywhere encountered. The meeting was large and intelligent, and as at Melfort, gave indications that when railway facilities are afforded these two sections of the country, they will be second to none in the Territories.

From Kinistino a westerly course was taken, and late at night, and after a long journey, a meeting was held at Harper's View. The meeting was probably the best of the series, not from the point of attendance, but from the eagerness of those present to find out everything that any one of the speakers could tell in regard to farming in all its branches. At this point the finest crops of grain and vegetables encountered on the trip were seen.

St. Louis de Langevin was the next meeting place. This is a point on the south branch of the Saskatchewan River, and was fixed in our memories by a pleasant visit to a large experimental garden, owned and worked by Mr. E. Lefebvre, whose flowers, shrubs, trees, fruit, grain and vegetables gave evidence of a rich soil and very careful and intelligent work.

Other meetings were held at Lindsay, Duck Lake and Rostbern, on the line of railway.

Acting under instructions from the Honourable the Minister of Agriculture, I visited Lethbridge, Alberta, in September, and had a conference with the management of the Lethbridge Irrigation Company, with reference to tree-planting in connection with their system of irrigation ditches.

A trip was also made to Calgary at the time of the Inter-western Provincial Exhibition, with the intention of visiting the irrigation experiment station at that place. Unfortunately, a heavy rain and snow storm raged over Alberta at that time, and it was impossible to see the farm.

This autumn a large institute meeting at Broadview was attended ; and a series of meetings is now being arranged in Eastern Assiniboia by Mr. M. Bulyea, in which I have promised to take part.

DISTRIBUTION OF SAMPLES.

During the months of March, April and May, the following distribution of samples was made to applicants throughout the territories of Assiniboia, Alberta and Saskatchewan.

The number of applicants was, as usual, largely in excess of the supply available for this purpose ; and the stock of seedling trees and shrubs, cuttings of fruit-bushes, rhubarb-roots and tree-seeds grown for the purpose, did not begin to fill all the orders received.

This, and the demand for larger trees by express, indicates a much more lively interest in tree and fruit growing than has heretofore been shown, and it is much to be regretted that, on account of the extremely dry season, our crop of seedlings is this year very small, and will be totally inadequate to fill the applications already beginning to come in.

Besides the seedlings mentioned below, many thousands of maple trees, from 3 to 5 feet in height, were given to settlers of the districts and others, who drove in as far as 50 miles to secure the means of beautifying their homesteads.

Grain.—Wheat, 190 bags, 3 pounds each.
" Oats, 310 bags, 3 pounds each.
" Barley, 160 bags, 3 pounds each.
" Pease, 140 bags, 3 pounds each.
" Flax, 8 bags, 3 pounds each.
" Rye, 20 bags, 3 pounds each.
Potatoes, 322 bags, 3 pounds each.
Tree-seeds, maple, 600 bags, 1 pound each.
Grass-seed, Brome, 300, 1 pound each.
Grass-seed, Western Rye grass, 250 bags, 1 pound each.

Small seeds, 410 packages, containing 2,631 pa. flower-seeds, 631 pa. shrub-seeds, 772 pa. root-seeds, and 278 bags garden pease and beans.

Rhubarb roots, 25 packages.

Tree-seedlings, 361 packages, containing Box-elder seedlings, Cottonwood cuttings, Caragana arborescens seedlings, Plum seedlings and Artemisia cuttings.

Fruit seedlings, 186 packages, containing Plum seedlings, Apple seedlings, Sand-cherry seedlings, and Currant seedlings or cuttings.

CORRESPONDENCE.

During the twelve months ending October 31, 1900, 5,389 letters were received, and 5,033 mailed from this office. In letters received, circular reports on grain and other samples are not counted, and in letters mailed, circulars of instruction sent with grain and other samples are not included.

METEOROLOGICAL.

Month.	Highest Temperature.		Lowest Temperature.		Snow-fall.	Rainfall.		Hours of Sunshine.
	On	Degrees	On	Degrees	Inches.	No. of Days.	Inches.	
1899.								
November	4	58	21	15	1	1	·2	96·9
December	21	41	29	—26	4	....	....	56·9
1900.								
January	19	43	30	—27	2.5	....	....	73·3
February	28	34	8	- 37	5	....	....	113·5
March	29	42	4	—27	4.5	....	....	131·6
April	22	81	16	18	....	2	·27	200·4
May	12	94	2	21	....	3	·8	241·4
June	22	106	13	33	....	7	·65	175·3
July	26	97	22	38	....	5	1·73	231·6
August	2	98	28	35	....	15	4·85	171·2
September	3	78	30	25	3	8	2·84	139
October	22	81	28	18	1	6	·4	102·2
Total	....	....	....	....	21	47	11·74	1733·3

I have the honour to be, sir,

Your obedient servant,

ANGUS MACKAY,

Superintendent.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B.C., November 30, 1900.

To Dr. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour herewith to submit my report of the experiments carried on and progress made in the year 1900.

The winter of 1899 and 1900 was a mild one, the lowest temperature recorded was 9 degrees above zero on February 15. January was mild, the lowest temperature registered being 27 degrees above zero on the 27th, and the lowest in March was 29 degrees above on the 17th, at which date the peach, apricot, nectarine and quite a number of plum trees were in bloom.

The mild weather in the winter months favoured the early development of the fruit buds with the result that many trees having bloomed in the first half of March, and two or three light frosts occurring during and after the time they were in bloom, the fruit failed to set and the apricot, nectarine and peach crop was almost a complete failure.

The spring was mild and wet, and favourable for grass and grain crops, on dry or drained land, up to the arrival of swarms of cut-worms in July, the promise of fine crops of grain, roots and potatoes was good.

The attack of cut-worms was so severe that roots, potatoes and pease suffered very severely, many pieces of pease and potatoes were not worth harvesting. June was very showery, the rainfall for that month being heavy, measuring 10 76-100th inches for the whole month, with 21 rainy days, making the curing of clover hay very difficult. Fortunately haying was begun at Agassiz early in the month and we got the benefit of all the fine weather there was in June, and secured a considerable portion of the clover in fine condition and the remainder was put into the silo.

Clover silage is eaten with better relish than corn, does not need to be cut when putting into the silo, and as two and sometimes three crops can be cut each season, it appears to be a better crop in this province for the purpose. Over thirteen tons per acre for the first cutting and nearly nine for the second and over five for the third cutting made a good yield per acre, and it has been saved as easily in the silo here as corn.

The fruit crop has, on the whole, been a poor one. Strawberries were injured by a frost when they were in bloom, and by cold heavy rains when the crop was ripening. Raspberries and blackberries fared better and were good crops. Cherries and plums suffered from the rot ; the almost constant rains in spring having washed off the fungicides almost as soon as they were applied, and in this way preventing effective work.

HEDGES

The sample hedges continue to grow and attract attention. The flowering hedges are very beautiful in their season, while the evergreens are handsome all the year. Many letters of inquiry about hedges have been answered and visitors to the farm always look them over carefully, many with a view of selecting one, which they will plant on their own grounds.

FOREST TREE PLANTATION.

The forest trees planted in the shelter belt continue to make a strong growth. The oak, ash, maple and other hardwood trees on the mountain side are getting above the ferns and other low growths, as shown in early autumn, when the foliage assumes autumn tints, at which time many of these eastern trees are quite conspicuous.

ORNAMENTAL SHRUBS AND TREES.

This portion of the experimental work has made very fine growth this season, and although in some instances the cut-worms took a considerable share of the foliage, the shrubs have leaved out again and do not appear to be materially injured. The Japanese hydrangeas and the roses continued to bloom up to the sharp frosts which occurred in the beginning of November.

NUT TREES.

The heart-shaped, Japanese and English walnuts all fruited this year, the latter variety for the first time and only a few nuts, but they have grown from very small trees in 1893, when they were planted, to trees of twenty feet high, with wide branching heads and the stems to six to seven inches in diameter at the collar. The Spanish and Japanese chestnuts also fruited and the nuts matured.

As there is considerable inquiry for nut trees in different parts of the province, these nuts have been distributed for planting. The filberts make a strong wood growth, but the pollen begins to mature and falls as early as the middle of January, and by the time the female blossom opens (here generally early in April), the pollen is nearly all blown away and lost ; in consequence of this the crop is light. It is intended to plant a few healthy bushes of the wild hazel nut in hopes that this may correct the partial barrenness of the more valuable cultivated varieties, by supplying pollen.

The hard-shelled almonds fruited again this year, but none of the soft-shelled varieties produced any fruit.

DITCHING.

About 680 yards of open ditch, 4 feet wide on top, 3 feet deep and 1 foot wide in the bottom, has been dug this fall, connecting at the outlet with the municipal ditch. The ditch as far as completed is doing good service, and when carried through to the terminus will, it is hoped, enable us to cultivate and crop land that has heretofore been too wet to work.

BREAKING AND CLEARING.

About six acres of land was broken up and cropped this year, and ten more cleared of all timber and brush and seeded to grass and clover. It is expected in this way to get a catch of grass and by pasturing the land for a few years with cattle and sheep, give the hardwood stumps time to rot, and the pasturing will aid in killing out the ferns, and in this way materially lessen the cost of clearing land, especially where there are not many fir or cedar trees. These, of course, do not rot for very many years.

LIVE STOCK.

The six horses purchased when the farm was first occupied, are still in good condition for work.

The cattle mentioned in my report of last year have all been disposed of but one Shorthorn cow, one Shorthorn heifer and one grade cow and calf ; since then a fine Shorthorn bull calf has been procured from the Experimental Farm at Indian Head,

and thirteen head of cattle bought for feeding, making eighteen head of cattle at present on the Experimental Farm.

SHEEP.

The four Dorset horned ewes and one ewe lamb wintered have produced six lambs this year; two buck lambs have been sold and one buck and three ewe lambs on hand. One buck lamb and the old ram wintered last year have been sold, which leaves nine head of sheep on the farm at present.

PIGS.

The stock at present consists of one Berkshire boar, and one sow, one Tamworth boar, one Tamworth sow, aged, one young Tamworth sow, and eight Tamworth pigs ; eight young cross-bred pigs, making twenty-two pigs of all sorts at present on the farm. The Tamworth pig appears to gain in popularity the better it is known.

BEES.

Three swarms of bees wintered, and were ready for work in the spring. Only one swarm has been saved this year, but all these, judging by their weight, are well supplied with honey for the winter.

POULTRY.

At present there are four breeds of poultry here : Brahmas, White Wyandottes, Barred Plymouth Rocks, and Black Minorcas.

The White Leghorns were sold this year, as they had been tested for a number of years, and were seldom inquired for.

The Barred Plymouth Rocks were procured this fall, to put in place of the White Leghorns.

The Brahmas, as in previous years, have been good layers, and the chickens can easily be made to weigh nine pounds, live weight, per pair, at four months old.

The White Wyandottes are good layers, and the chickens, if well cared for, will weigh about eight and a-half pounds, live weight, per pair, at four months old. The White Wyandotte is a round-bodied, short-legged, close-feathered fowl, and their feathers will probably shed the rain better than the Brahmas, as these are rather open-feathered. Their bare legs also may make the White Wyandotte, when full grown, a little better suited to this climate, than the Brahma.

Chickens of all breeds require to be warmly and carefully housed, sheltered from cold spring rains.

The Black Minorcas are the best layers here, and their eggs are large, but the chickens do not make satisfactory broilers.

All the fowls are comfortably housed and regularly fed, but they are never forced either for eggs or for fattening. They are all allowed to run at large except when put into pens for breeding purposes—from January to July.

The cocks of each breed are changed every year, to prevent inbreeding, and with ordinary good care the chickens are strong and healthy.

EXPERIMENTS WITH SPRING WHEAT.

Forty-nine varieties of wheat were tested this year. They were on sandy loam, all sown on April 10, on plots of one-fortieth of an acre each. The seed for this test was from heads selected last year. Eight plots were sown with seed taken from the produce of the test plot, when threshed, without selecting. All were sown on soil of similar character and treatment. The results do not in every case show better results from the selected seed, but it should be borne in mind that the seed for all the plots

here has been carefully screened, and efforts made to secure the largest and most perfect grains for seed for many years.

The plots grown from the selected heads presented a more uniform appearance, and ripened more evenly than the others. There was no rust or smut on any of the plots.

Spring Wheat—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs.
1	Huron	Aug. 2.	113	46	Strong	2-3	Bearded	3	80	30	20	61½
2	Monarch	" 10.	121	50	"	3¼	Beardl's	2	400	29	30	61
3	Red Fife	" 9.	120	48	"	3¼	"	1	1,560	29	30	62
4	Crown	" 4.	115	46	"	3½	Bearded	2	1,000	28	30	60¾
5	White Russian	" 11.	122	38	"	3½	Beardl's	2	1,200	28	10	60
6	Fraser	July 30.	111	38	"	3	Bearded	2	1,200	27	40	61¼
7	Preston	Aug. 3.	114	44	"	3	"	2	80	27	10	60¼
8	Wellman's Fife	" 10.	121	50	"	3	Beardl's	2	880	26	30	60¾
9	Beauty	" 10.	121	40	Medium	3¼	"	2	720	26	30	60½
10	Ladoga	" 2.	113	44	Strong	3¼	Bearded	2	600	26	20	60¾
11	Advance	" 2.	113	46	"	2½	"	2	400	26	20	63½
12	White Connell	" 9.	120	42	"	3	Beardl's	2	1,200	26	..	61
13	Progress	" 11.	122	48	"	3¼	"	2	1,000	26	..	61½
14	Goose	" 9.	120	44	"	3¼	Bearded	2	1,040	26	..	61
15	Vernon	" 2.	113	42	"	2½	"	2	1,680	25	40	62¼
16	Blair	" 4.	115	40	Medium	2½	Beardl's	2	400	25	40	61¾
17	Pringle's Champlain	" 10.	121	46	"	3	Bearded	2	1,680	25	20	60¼
18	Norval	" 3.	114	42	Strong	2½	"	2	600	25	10	60¾
19	Plumper	" 3.	114	38	Weak	3	"	2	440	25	..	60¾
20	Red Fern	" 10.	121	42	Strong	2½	"	2	1,600	24	40	61¾
21	Alpha	" 10.	121	50	"	3¼	Beardl's	2	1,000	24	30	62¼
22	Herisson Bearded	" 10.	121	38	Weak	2¼	Bearded	2	480	24	20	61¼
23	White Fife	" 10.	121	38	Medium	2½	"	2	400	24	20	61¼
24	Blenheim	" 3.	114	44	Strong	3	"	2	1,120	24	10	62
25	Roumanian	" 10.	121	48	Medium	3¼	"	2	160	24	10	62
26	Red Swedish	" 9.	120	42	Strong	3¼	"	2	1,040	24	10	60¾
27	Dufferin	" 3.	114	40	Medium	2½	"	2	980	24	..	61¼
28	Byron	" 2.	113	38	Weak	2¾	"	2	400	23	30	61
29	Dion's	" 9.	120	40	Strong	3¼	"	2	1,500	23	30	61½
30	Countess	" 3.	114	38	Medium	2½	Beardl's	1	1,800	23	20	61¼
31	Clyde	" 9.	120	40	"	3¾	"	2	480	23	20	62
32	Percy	" 10.	121	42	"	3	"	2	80	23	10	60¾
33	Rideau	" 11.	122	42	Strong	2¾	"	2	80	23	10	61½
34	Dawn	" 10.	121	38	"	2¾	"	1	1,760	22	30	61¾
35	Captor	" 3.	114	46	"	2¾	"	2	520	22	20	62¼
36	Crawford	" 3.	114	36	Weak	2¼	"	1	1,920	22	20	60¾
37	Stanley	" 4.	115	42	Strong	3¼	"	2	600	22	20	63
38	Hungarian	" 9.	120	46	Medium	3½	Bearded	2	1,220	22	20	62
39	Rio Grande	" 11.	122	38	Strong	3	"	2	1,280	22	20	60
40	Colorado	" 10.	121	40	Medium	3	"	2	600	21	20	60
41	Laurel	" 13.	124	46	Strong	3½	Beardl's	2	560	21	10	61½
42	Ebert	" 3.	114	34	Weak	2¼	"	1	1,560	21	..	60
43	Beaudry	" 10.	121	38	Strong	3	Bearded	2	360	20	30	62¼
44	Mason	July 31.	111	44	Weak	2½	Beardl's	2	1,600	20	20	61
45	Admiral	Aug. 10.	121	40	Strong	4	"	1	1,920	20	10	61¼
46	Early Riga	July 30.	110	34	Weak	2½	"	2	....	20	..	60
47	Weldon	Aug. 13.	124	36	"	2¾	"	1	1,870	18	20	60
48	Campbell's White Chaff	" 11.	122	40	Medium	3	"	1	1,760	17	10	61
49	Harold	July 30.	110	36	Weak	2¼	Bearded	1	1,960	16	50	60¼

SPRING WHEAT—TEST OF VARIETIES GROWN FROM SCREENED SEED.

Name of Variety.	Date of Sowing,	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs	
Wellman's Fife	April 11.	Aug. 13.	123	50	Stiff & bright	3	Beardless.	2	1,200	29	20	61	None.
White Connell.	" 11.	" 11.	121	42	" " .	3	"	2	960	27	20	61¼	"
Colorado......	" 11.	" 11.	121	38	Medium...	3	" .	2	1,200	24	20	60	Slightly.
Preston.	" 11.	" 5.	115	40	Stiff & bright	2½	" .	1	1,720	24	20	61¼	None.
White Russian.	" 11.	" 13.	123	38	Medium....	3½	" .	1	1,360	21	40	61	Slightly.
White Fife...	" 11.	" 12.	122	36	Weak	2	" .	1	1,120	21	..	60	"
Red Fife... .	" 11.	" 10.	120	46	Stiff & bright	3	" .	2	....	21	..	61	"
Percy.	" 11.	" 12.	122	38	Weak	2½	" .	1	1,800	20	30	60½	"

EXPERIMENTS WITH OATS.

Sixty-one varieties of oats were sown in the uniform trial plots. All were sown on sandy loam, on April 16, except Salzer's Big Four, which was not on hand in time to be sown with the others, but was sown alongside on May 11. The size of the plots was one-fortieth acre each. The rust attacked some varieties rather severely, and lessened the yield and damaged the sample. The cut worm, too, injured the later sorts.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.		No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
					In.		In.		Tons	Lbs.	Bush.	Lbs.	Lbs	
1	Prolific Blk Tartarian...	Aug.	13	118	48	Strong...	10	Sided ...	3	1,440	59	14	41	Badly.
2	Black Beauty.......... .	"	6	111	48	" ..	11	Branching	3	1,000	58	28	39	Slightly.
3	Holstein Prolific........	"	13	118	42	" ..	10	" .	4	80	58	28	35	Badly.
4	Thousand Dollar.......	"	8	113	48	" ..	10	" .	3	800	58	8	34	Slightly.
5	Abyssinia..............	"	13	118	50	" ..	11	" .	3	920	57	22	35½	"
6	Columbus..............	"	8	113	48	" ..	10	" .	3	888	57	12	34	"
7	Golden Giant..	"	15	120	50	Medium.	11	Sided.....	3	600	57	12	34	Badly.
8	Early Blossom..........	"	10	115	42	" ..	8	"	3	1,600	56	16	33½	Slightly,
9	California Prolific Blk...	"	13	118	46	Strong...	11	"	3	1,280	56	6	34	"
10	Kendal	"	14	119	50	" ..	10	"	3	200	55	20	34	Badly.
11	Early Golden Prolific...	"	8	113	48	" ..	9	Branching	3	200	55	20	34	Slightly.
12	Mennonite......... ...	"	8	113	40	" ..	9	" .	3	200	54	24	34	"
13	Black Mesdag..........	"	7	112	40	" ..	10	" .	2	1,000	54	24	34	"
14	Improved American	"	11	116	48	" ..	11	" .	2	1,800	54	14	34	Badly.
15	Cromwell..............	"	9	114	50	" ..	11	" .	3	200	54	4	33	Slightly.
16	Oderbruch......	"	8	113	46	" ..	9	" .	3	800	53	28	34	None.
17	California Prol. Blk. Imp	"	13	118	46	" ..	11	Sided.....	3	940	53	18	34	Slightly.
18	American Triumph	"	13	118	48	Medium.	10	Branching	3	560	53	18	34	Badly.
19	Holland...............	"	13	118	46	Stiff.....	10	Sided.....	2	1,800	53	8	34	Slightly.
20	Lincoln	"	11	116	44	Weak. ..	9	Branching	2	1,200	53	8	33	"
21	Abundance.............	"	13	118	44	Stiff.....	10	" .	2	1,280	52	22	34	"
22	Banner	"	13	118	48	"	9	" .	3	1,120	52	22	32	Badly.
23	Improved Ligowo, Impt.	"	9	114	44	"	10	" .	2	1,200	52	12	34	Slightly.
24	Black Tartarian, Impt..	"	13	118	42	Medium.	10	Sided.....	2	800	52	12	33	Badly.
25	Flying Scotchman......	"	8	113	46	Stiff.....	10	Branching	3	1,200	51	16	32	"
26	Master.................	"	15	120	42	Medium.	8	" .	2	1,680	51	16	34	"
27	Olive	"	11	116	48	" ..	10	Sided.....	3	.....	51	16	34	Slightly.
28	Siberian, O.A.C........	"	14	119	42	" ..	9	"	2	1,000	51	6	34	Badly.

SPRING WHEAT—TEST OF VARIETIES—*Con.*

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Tons	Lbs.	Bush.	Lbs.	Lbs	
29	New Zealand.	Aug. 14	119	48	Stiff.....	9	Branching	3	.....	50	30	34	Badly.
30	Hazlett's Seizure........	" 13	118	50	"	10	" .	2	1,360	50	30	34	"
31	Rosedale...	" 15	120	48	"	9	" .	2	1,280	50	20	34	"
32	Buckbee's Illinois	" 14	119	44	Medium.	9	" .	2	1,360	50	10	34	"
33	Salines............	" 13	118	44	Stiff. ...	10	" .	3	400	50	..	34	Slightly.
34	American Beauty... ..	" 15	120	46	"	9	"	2	1,280	50	..	34	Badly.
35	Improved Ligowo	" 9	114	42	Medium.	9	" .	2	1,800	49	24	34	Slightly.
36	White Schonen.........	" 9	114	48	" ..	9	" .	2	1,480	49	14	34	"
37	Early Maine...... ..	" 14	119	44	" ..	9	Sided.....	2	1,360	49	4	32	Badly.
38	Milford	" 14	119	44	" ..	9	Branching	3	1,600	48	28	33	"
39	Golden Tartarian.	" 13	118	42	Stiff.....	10	Sided.....	3	.....	48	18	34	Slightly.
40	White Russian	" 8	113	40	Medium.	9	Branching	3	1,500	48	18	34	"
41	Early Dawson	" 4	109	50	Stiff.....	11	" .	2	1,200	48	18	34¼	None.
42	Bavarian..............	" 13	118	46	"	10	" .	2	1,360	47	32	33	Badly.
43	Cream Egyptian........	" 15	120	48	Medium	10	" .	2	1,300	46	16	33	"
44	Pense.............. ..	" 15	120	48	Stiff.....	10	Sided.....	2	400	46	16	33	"
45	White Giant.	" 9	114	42	"	10	Branching	2	400	46	6	34	Slightly.
46	Miller.................	" 13	118	46	Medium.	8	" .	2	1,300	45	30	33	"
47	Early Gothland.... ...	" 9	114	48	Stiff.....	9	" .	2	1,200	45	30	34	"
48	Golden Beauty	" 15	120	46	"	10	" .	2	1,520	45	30	33	Badly.
49	Early Archangel.. .	" 13	118	42	Medium.	9	" .	2	1,680	45	20	33	"
50	Salzer's Big Four.......	" 27	107	50	Stiff.....	9	Sided.....	3	400	45	20	34	Slightly.
51	Wallis....	" 13	118	44	Medium.	9	Branching	3	80	43	18	34	Badly.
52	Joanette............. ..	" 16	119	38	Weak ...	9	" .	2	1,120	43	18	33	"
53	Russell	" 14	119	42	Medium.	10	" .	2	1,740	43	18	34	"
54	Brandon.	" 11	116	46	Stiff. ..	10	" .	2	1,200	43	18	34	Slightly.
55	Bonanza.	" 10	115	48	Medium.	9	" .	2	1,200	42	18	33¼	Badly.
56	King	" 13	118	48	Stiff.....	10	" .	2	1,200	42	18	34	"
57	Sensation	" 8	113	38	Weak. ..	9	" .	2	800	42	4	33	Slightly.
58	Wide Awake.	" 14	119	46	Medium.	9	"	2	880	41	18	32½	Badly.
59	Newmarket	" 13	118	44	" ..	9	" .	2	1,300	40	..	33	Slightly.
60	Oxford.....	" 14	119	42	Stiff.....	10	" .	2	400	38	28	34	Badly.
61	Danish Island....	" 10	115	48	"	10	" .	2	160	37	22	34	"

EXPERIMENTS WITH BARLEY.

Forty-five varieties of barley were tested, eighteen of which were two-rowed sorts and twenty-seven were six-rowed. They were all on sandy loam of fairly uniform character; the size of the plots was one-fortieth of an acre, and they were all sown on April 20 and 21. The seed for these plots had been got from heads selected before the crop was harvested in 1899. Four plots of two-rowed and six of six-rowed sorts were sown alongside, with seed taken from the general crop after the plots were threshed. This was prepared as usual by screening, reserving only the plump grain for seed. While the results are not uniform, the advantage in most instances is decidedly in favour of the seed from the selected heads.

There was no rust or smut on any of the plots in the test of varieties.

Two-rowed Barley—Test of Varieties.

No.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.	Tons.	Lbs.	Bush.	Lbs,	Lbs.
1	Jarvis	Aug. 1..	102	44	Strong ...	3¼	4	400	41	32	48¼
2	Nepean	" 1..	102	47	"	3½	4	800	41	22	49¾
3	Danish Chevalier	" 9..	110	44	"	3½	2	1,380	37	4	48¾
4	Prize Prolific	" 8..	109	42	Medium..	3½	2	1,520	36	12	48½
5	Victor	" 8..	109	46	Strong ..	3½	4	....	34	38	48¼
6	French Chevalier	" 8..	109	42	"	3½	3	1,000	34	28	48½
7	Beaver	" 8..	109	43	Weak	3	3	1,400	34	8	49
8	Harvey	" 9..	110	42	Strong ...	3¼	3	1,200	33	28	49¼
9	Kinver Chevalier	" 7..	108	38	"	3½	3	80	32	24	48½
10	Bolton	" 1..	102	44	"	3½	4	80	31	42	48¾
11	Canadian Thorpe	" 7..	108	44	"	3½	3	440	31	32	49
12	Newton	" 7..	108	41	Medium..	3	3	960	31	22	48
13	Sidney	" 6..	107	36	Strong ...	3	3	1,120	30	20	48¼
14	Dunham	" 3..	104	50	"	3½	3	1,000	30	10	48
15	Fulton	" 9..	110	46	"	3½	3	400	30	10	48
16	Leslie	" 8..	109	44	"	4	2	1,600	29	18	48¼
17	Logan	" 3..	104	48	"	3	3	600	29	18	48½
18	Clifford	" 7..	108	42	"	3	2	320	28	8	48

Six-Rowed Barley—Test of Varieties.

1	Mensury	July 27..	97	48	Stiff, bri't.	3	3	800	44	8	49
2	Nugent	" 27..	97	44	" ..	2½	4	80	41	12	49¾
3	Odessa	" 27..	97	46	" ..	3	3	600	40	20	48
4	Claude	Aug. 8..	109	43	" ..	3½	3	400	40	10	48
5	Yale	" 8..	109	44	" ..	3¼	3	200	40	..	48
6	Petschora	July 24..	94	40	" ..	2½	3	120	39	38	47¾
7	Baxter	" 27..	97	46	" ..	2½	3	800	38	42	47½
8	Common	Aug. 3..	105	40	" ..	3	2	1,000	38	42	47
9	Trooper	" 8..	110	40	" ..	3	3	1,200	38	32	50
10	Albert	July 31..	102	38	" ..	3	3	1,360	38	32	48¼
11	Oderbruch	" 25..	96	46	" ..	2¾	2	1,760	38	16	48¾
12	Blue Long Head	" 31..	102	42	" ..	2½	2	1,720	37	44	46¾
13	Champion	" 24..	95	40	" ..	2½	2	960	37	32	47¾
14	Excelsior	" 31..	102	42	" ..	2½	3	1,000	37	4	46
15	Vanguard	" 31..	102	40	" ..	3	3	1,280	36	42	47¼
16	Phœnix	" 28..	99	44	" ..	2½	2	1,600	36	22	50
17	Argyle	Aug. 1..	103	38	Medium..	2¼	3	520	36	22	48¾
18	Pioneer	July 31..	102	40	Stiff, bri't.	2-3	2	1,680	35	40	48
19	Mansfield	" 31..	102	34	"	2½	2	1,600	33	40	47¾
20	Royal	Aug. 1..	103	44	Medium .	2	2	800	32	14	49
21	Garfield	July 31..	102	40	" ..	3	3	560	32	10	48
22	Brome	Aug. 1..	103	48	Stiff, brit'.	3	3	1,512	32	4	48
23	Summit	" 8..	110	42	Weak ...	4	2	400	29	38	48¾
24	Stella	" 8..	110	36	Medium..	3½	2	200	29	28	46¾
25	Empire	July 31..	102	42	" ..	3	2	1,600	28	16	47¾
26	Success	" 24..	95	38	" ..	2¼	1	1,160	27	34	47½
27	Hulless Black	Aug. 3..	105	40	" ..	2	2	100	26	40	56

Barley—Test of Varieties.

(Grown from screened seed—Two-rowed sorts.)

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.	Tons.	Lbs.	Bush.	Lbs.	Lbs.	
Sidney............	Aug. 8..	109	36	Strong ...	3	2	400	31	12	49	Slightly.
Canadian Thorpe...	" 8..	109	44	"	3½	2	280	29	16	48	None.
Danish Chevalier...	" 18..	118	39	"	3	1	1,920	28	46	48¼	"
Beaver	" 15..	115	38	Weak	3	2	600	24	16	48	"

Six-Rowed Sorts.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.	Rusted.
Royal............	Aug. 4..	105	40	Medium..	2	1	800	30	..	48	Slightly.
Trooper...........	" 8..	110	40	Strong ...	3	2	600	28	26	48	None.
Mensury...... ..	July 27..	97	44	"	3	1	1,880	27	44	48¼	Slightly.
Champion..........	" 26..	96	36	"	2½	2	....	27	24	48	"
Odessa......	" 28..	98	40	Medium..	2½	2	800	27	4	47¾	None.
Petschora..........	" 26..	96	38	" ..	2½	2	....	25	20	48	Slightly,

EXPERIMENTS WITH PEASE.

There were fifty-seven varieties of pease tested this year. All were sown on April 3, on sandy loam, on plots measuring one-fortieth of an acre each. The land was in fine condition, but shortly after the pease were sown heavy rains began and continued many days, and they were injured to a considerable extent, many of them decaying in the ground. When the earliest varieties were beginning to ripen, the cut-worm came, and in some cases almost destroyed the crop.

Pease—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Growth.	Length of Pod.	Size of Pea.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs
1	Early Britain.............	Aug. 9..	127	66	Medium..	2½	Large	3	720	32	10	61½
2	Duke	" 13..	131	48	Weak	3½	" ...	2	800	30	20	61¾
3	Fenton....................	" 13..	131	54	Medium..	2½	"	2	1,560	30	10	60½
4	Daniel O'Rourke...........	" 4..	122	40	" ..	3	Small	2	880	29	10	61½
5	White Wonder.............	" 15..	133	40	" ..	2½	Medium..	2	1,580	29	10	62
6	German White.............	" 11..	129	54	" ..	3	" ..	2	1,120	29	..	62½
7	Bruce	" 14..	132	58	" ..	3½	Large	2	1,520	29	..	61¼
8	Pride	" 9..	127	44	Weak	3	" ...	1	1,960	28	20	61½
9	Perth	" 9..	127	60	"	2½	"	2	1,680	28	.	61
10	Large White Marrowfat....	" 15..	133	50	Medium..	2	"	2	1,460	27	50	60
11	Wisconsin Blue...........	" 11..	129	52	" ..	3	Small	2	1,360	27	30	62¼
12	Prince.....................	" 9..	127	46	Strong....	2½	Large	2	400	27	20	61¼
13	Lanark..	" 4..	122	42	"	2½	"	2	960	27	20	62
14	French Canner............	" 9..	127	34	Medium..	2¼	Medium..	2	1,200	27	20	62
15	Crown	" 7..	125	52	" ..	2½	Small	2	600	26	40	61¼
16	Herald	" 11..	129	50	" ..	3	Large	2	80	26	30	61¼

PEASE—TEST OF VARIETIES—*Concluded.*

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Growth.	Length of Pod.	Size of Pea.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.		Tons.	Lbs.	Bush.	Lbs.	Lbs
17	Arthur	Aug. 9..	127	40	Medium..	3	Large.....	1	1,360	26	10	62
18	Harrison's Glory	" 11..	129	38	" ..	$2\frac{1}{2}$	"	2	1,200	26	..	$60\frac{1}{2}$
19	Black Eyed Marrowfat	" 10..	128	56	Weak	3	"	2	600	26	..	60
20	Victoria	" 15..	133	66	"	3	Small	2	1,000	26	..	$60\frac{1}{2}$
21	Picton	" 9..	127	68	Medium..	$3\frac{1}{4}$	Medium..	2	1,800	26	..	$62\frac{1}{4}$
22	Macoun	" 13..	131	64	Weak	3	Large	2	1,280	26	..	$60\frac{1}{4}$
23	Archer	" 13..	131	60	"	$2\frac{1}{2}$	Medium..	2	1,920	25	50	$60\frac{1}{2}$
24	Elephant Blue	" 9..	127	48	Medium..	$2\frac{1}{2}$	" ..	2	1,000	25	50	$61\frac{1}{4}$
25	Canadian Beauty	" 15..	133	60	" ..	$3\frac{1}{2}$	Large	2	1,920	25	40	$61\frac{3}{4}$
26	Trilby	" 8..	126	54	" ..	3	Medium..	2	600	25	20	60
27	New Potter	" 10..	124	58	Weak	$2\frac{1}{2}$	Large	2	..	25	10	$60\frac{1}{2}$
28	Chancellor	" 15..	133	60	Medium..	$3\frac{1}{4}$	Small .. .	2	1,440	24	40	61
29	Centennial	" 13..	131	54	" ..	3	Medium..	2	320	24	40	$61\frac{1}{4}$
30	Agnes	" 14..	132	60	" ..	$3\frac{1}{4}$	Large	2	1,040	24	40	$60\frac{3}{4}$
31	English Gray	" 9..	127	54	" ..	3	Medium..	2	1,520	24	30	$61\frac{1}{2}$
32	Fergus	" 13..	131	60	Weak ...	$3\frac{1}{2}$	Small	2	1,200	24	30	$60\frac{1}{2}$
33	Gregory	" 14..	132	60	"	4	Medium..	2	1,600	24	20	60
34	Mackay	" 9..	127	56	"	3	Small	2	1,340	24	..	$60\frac{1}{4}$
35	Elliot	" 14..	132	48	Medium..	$2\frac{1}{2}$	....	2	400	23	30	60
36	Carleton	" 9..	127	58	Weak	3	Medium..	2	1,240	23	20	60
37	Vincent	" 9..	127	50	Medium..	3	Large	2	1,240	23	..	$60\frac{1}{2}$
38	Prussian Blue	" 15..	133	60	" ..	3	Medium..	2	80	22	40	61
39	King	" 10..	128	50	" ..	3	Large	1	1,400	22	20	$60\frac{1}{4}$
40	Dover	" 13..	131	46	Weak	3	....	2	440	22	20	$60\frac{3}{4}$
41	Bright	" 14..	132	60	"	3	Medium..	1	1,960	21	40	60
42	Chelsea	" 15..	133	48	"	3	....	2	640	21	20	$60\frac{3}{4}$
43	Cooper	" 11..	129	50	Medium..	$2\frac{1}{2}$	Large	1	600	21	..	$59\frac{3}{4}$
44	Oddfellow	" 8..	126	48	Weak	$2\frac{1}{2}$	Medium..	1	1,520	21	..	$61\frac{1}{2}$
45	Mummy	" 11..	129	56	Medium..	$2\frac{1}{2}$	" ..	2	320	20	30	61
46	Kent	" 15..	133	56	Weak	3	Large	2	400	19	40	60
47	Pearl	" 15..	133	50	"	3	....	2	400	19	40	60
48	Grass Pea	Sept. 2..	144	36	Medium..	2	Small	..	..	19	40	60
49	Nelson	Aug. 10..	128	66	Weak	3	Medium..	2	560	19	10	$60\frac{1}{4}$
50	Golden Vine	" 11..	129	62	Medium..	$2\frac{1}{2}$	Small	2	40	19	..	62
51	Bedford	" 15..	133	58	Weak	3	Medium..	2	1,000	18	50	$60\frac{1}{2}$
52	Elder	" 9..	127	58	" ...	$2\frac{1}{2}$	....	2	600	18	..	60
53	Multiplier	" 6..	124	50	Strong....	3	Small	2	1,800	18	..	$60\frac{1}{2}$
54	Prince Albert	" 15..	133	54	Weak	2	"	2	80	16	50	$60\frac{1}{2}$
55	Creeper	" 9..	127	56	" ...	3	"	1	1,120	15	40	$61\frac{1}{4}$
56	Alma	" 9..	127	47	"	3	"	1	200	15	..	60
57	Paragon	" 11..	129	54	" ...	2	Medium..	1	1,240	15	..	60

EXPERIMENTS WITH INDIAN CORN.

Thirty-two varieties of corn were planted in this test. All were planted on May 29 and 30. The weather throughout June and the first half of July was so wet and cool that the corn made very poor growth, and presented a yellowish sickly appearance. After the middle of July it picked up a little, but the season, on the whole, has been very unfavourable for this crop, and very few varieties made even fairly good ears of roasting condition by October 3, when it was cut. The land was a sandy loam, and in good condition for corn, having had a thick seeding of clover turned under in early May. All the varieties were tested in drills and in hills, the drills being 3 feet apart, and the hills 3 feet apart each way, as in previous years. The drills average a little the heaviest yield. The yields have been calculated from the weight of green fodder cut from two rows, each 66 feet long.

Indian Corn.—Test of Varieties.

	Name of Variety.	Character of Growth.	Description of Variety.	Height.	Leafiness.	When Tasselled.	In Silk.	Early Milk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
				Inches.						Tons.	Lbs.	Tons.	Lbs.
1	Superior Fodder	Very strong	Dent	100-120	Very	Sept. 4	Sept. 18	Oct. 3	Early milk	26	800	25	1480
2	Mammoth Cuban	"	"	96-112	"	" 1	" 16	" 3	"	26	680	25	820
3	Pride of the North	"	"	112-120	"	" 8	Oct. 1		In silk	26	360	22	1430
4	Red Cob Ensilage	"	"	115-120	"	" 1	Sept. 22	Oct. 3	Early milk	26	360	24	1280
5	Cloud's Early Yellow	Strong	"	108-115	"	" 1	" 22	" 3	"	25	1040	25	600
6	Extra Early Huron	"	"	108-120	"	Aug. 21	" 10	Sept. 20	Late milk	24	1720	20	1250
7	Early Mastodon	Fair	"	90-100	"	" 21	" 10	" 20	"	24	1500	25	820
8	Champion White Pearl	"	"	100-120	"	Sept. 3	" 24	Oct. 3	Early milk	23	530	22	100
9	Early Yellow Long Eared	"	"	70- 76	"	" 1	" 22	" 3	"	21	680	18	520
10	Giant Prolific Ensilage	Strong	"	110-120	"	" 1	" 15	" 3	"	21	570	20	1800
11	King of the Earliest	Medium	"	100-108	Medium	Aug. 16	" 3	" 3	"	21	1580	20	40
12	Salzer's All Gold	"	"	72- 80	Very	" 14	" 1	Sept. 14	Glazed	20	1360	18	1070
13	Country Gentleman	Fair		80- 90	Medium	Sept. 20	Oct. 3		In tassel	19	280	17	1530
14	Mammoth 8 Rowed Flint	Strong		95-110	Very	Aug. 16			Roasting ear	18	1620	14	1810
15	Thoroughbred White Flint	"	Flint	100-115	"	" 1	Sept. 22		Early milk	18	1180	17	980
16	Evergreen Sugar	Fair		85- 90	"	" 1	" 24		In silk	18	960	13	1060
17	Pearce's Prolific	Strong		. . -110	"	" 28	" 20		Late milk	18	630	17	540
18	Angel of Midnight	Fair		86- 96	"	" 30	" 18		Early milk	17	760	16	780
19	Yellow 6 Weeks Extra	"		96-110	Fair	" 14	" 1		Glazed	17	760	16	1440
20	Early Butler	Strong		110-120	Very	" 18	" 10		Roasting ear	17	320	18	300
21	White Cap Yellow Dent	"	Dent	105-110	"	" 20	" 15		" "	17	320	16	780
22	Selected Leaming	Medium		100-110	Medium	" 28	" 15		Early milk	16	670	14	1480
23	Kendall's Early Giant	Fair		90-100	Very	Sept. 1			"	26	10	13	1720
24	North Dakota White	Strong		84- 90	Medium	Aug. 20	Sept. 8		Late milk	15	800	14	1040
25	Sanford	"		100-108	Very	Sept. 1			Early milk	15	690	13	1280
26	Canada White Flint	"	Flint	80- 90	Medium	" 6	Sept. 22		Roasting ear	15	580	14	930
27	Compton's Early	"		100-106	Very	" 15			Early milk	15	360	14	930
28	Longfellow	"		90-100	"	" 3			Late milk	15	360	14	1700
29	Salzer's Earliest Ripe	Fair		48- 54	Medium	Aug. 11	Sept. 1	Sept. 15	Glazed	14	1810	13	1610
30	North Dakota Yellow	Poor	Flint	48- 60	"		" 1		"	14	1480	13	1390
31	Extra Early Szekely	Fair		50- 60	"	Aug. 28	" 10		Late milk	13	1280	13	730
32	Mitchell's Extra Early	"		48- 60	"	July 21	Aug. 2	Sept. 1	Ripe	11	1210	11	110

INDIAN CORN PLANTED AT DIFFERENT DISTANCES APART.

Three varieties of corn were chosen for this test, and the distances ranged from 21 inches apart to 3½ feet. The plants were thinned to 6 inches apart in the rows. The closer planting has in each case given the heaviest yield, but the ears were fewer, not so well filled out, nor so long or as well matured as where the rows were wider apart. The hills were of equal distance apart, and were thinned to three or four strong plants in each hill. The soil was sandy loam, and the yields per acre have been calculated from the weight of green corn cut from two rows, each 66 feet long.

Name of Variety.	Date of Sowing.	Distance apart in rows.	Distance apart in hills.	Condition when cut.	Weight per acre grown in rows.	Weight per acre grown in hills.
					Tons. Lbs.	Tons. Lbs.
Longfellow	May 23	21 inches apart	21 inches apart	Early milk	19 228	21 581
"	" 23	28 "	28 "	"	21 145	21 1843
"	" 23	35 "	35 "	"	17 1074	15 1228
"	" 23	42 "	42 "	"	18 1528	17 1384
Champion White Pearl	" 23	21 "	21 "	"	32 1820	31 1206
" "	" 23	28 "	28 "	"	25 1055	26 244
" "	" 23	35 "	35 "	"	24 428	23 499
" "	" 23	42 "	42 "	"	18 1714	18 1431
Selected Leaming	" 23	21 "	21 "	"	30 1166	30 852
" "	" 23	28 "	28 "	"	23 671	22 1822
" "	" 23	35 "	35 "	"	22 1962	22 1030
" "	" 23	42 "	42 "	"	17 1263	16 246

EXPERIMENTS WITH TURNIPS.

Twenty-eight varieties of turnips were tested, two sowings of each variety being made. The first on May 18 and the second on June 1, and the roots from both sowings were pulled on October 23. The land was similar in character and preparation to that on which the mangels were sown, and, but for the damage done to the crop by cutworms it would have been a very heavy one as the stand was even and very promising when they came up. The roots averaged small but uniform, and the quality is very good. Four rows of one hundred feet each were sown of each variety at both sowings, and the yield per acre has been computed from 66 feet of the two centre rows in each case.

TURNIPS.—TEST OF VARIETIES.

No.	Name of Variety.	Yield Per Acre. — 1st Plot.		Yield Per Acre. — 1st Plot.		Yield Per Acre. — 2nd Plot.		Yield Per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Perfection Swede	36	160	1,202	40	31	920	1,048	40
2	West Norfolk Red Top	28	1,200	953	20	22	....	733	20
3	Bangholm Selected	26	1,680	894	40	25	820	847	
4	Elephant's Master	26	800	880	....	22	220	737	
5	Mammoth Clyde	25	1,920	865	20	25	1,040	850	40
6	Imperial Swede	25	1,920	865	20	22	1,020	753	20
7	Champion Purple Top	24	1,280	821	20	26	1,680	894	40
8	Selected Purple Top	24	1,280	821	20	18	80	601	20
9	Drummond Purple Top	20	1,580	693	...	19	1,600	660	
10	Prize Winner	19	1,380	656	20	19	620	660	20
11	Hartley's Bronze	19	1,160	652	40	19	620	660	20
12	Shamrock Purple Top	19	280	638	....	15	800	513	20
13	Halewood's Bronze Top	18	1,400	623	20	14	1,040	484	
14	New Arctic	18	520	608	40	16	1,880	564	40
15	Hall's Westbury	18	80	601	20	20	700	678	20
16	Prize Purple Top	18	80	601	20	16	560	542	40
17	Monarch	17	1,970	597	50	16	120	535	20
18	Giant King	17	1,860	597	40	15	360	506	
19	Kangaroo	17	1,860	597	40	13	400	440	
20	Carter's Elephant	17	1,200	586	40	16	560	542	40
21	Sutton's Champion	17	1,080	584	40	15	1,240	520	40
22	Selected Champion	17	320	572	....	16	560	542	40
23	Jumbo	17	320	572	....	15	1,680	528	
24	East Lothian	16	1,000	550	....	11	1,760	396	
25	Marquis of Lorne	16	780	546	20	16	1,660	561	
26	Skirvings	16	560	542	40	18	80	601	20
27	Magnum Bonum	15	1,680	528	....	19	280	638	
28	Webb's New Renown	15	1,680	528	..	11	1,980	399	40

EXPERIMENTS WITH MANGELS.

Twenty-two varieties of mangels were tested this year. The soil was a sandy loam which had been in clover in 1899 ; the clover sod was turned under in the autumn of 1899, when the land was given a dressing of stable manure, which was well-worked into the soil with the spading-harrow and drag. The land was in good condition when the first sowings were made, April 25. Before the second sowing was made, May 12, the weather had turned cold and wet and continued so all through May and most of June, and in consequence the seed did not germinate well and the stand was very uneven. The growth was only fair when the cut-worms attacked the crop in July and nearly ruined it ; some varieties have made a fair crop, but the unfavourable spring and the cut-worms materially lessened the yield. Two sowings were made of each variety, and four rows each, one hundred feet long were sown in every case, and the yield computed from 66 feet of the two centre rows. The roots from both sowings were pulled October 23.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant Yellow Intermediate	28	1,960	966	..	21	1,120	718	40
2	Giant Yellow Half Long	26	800	880	..	19	1,380	656	20
3	Half Long Sugar Rosy	22	1,760	762	40	18	80	601	20
4	Champion Yellow Globe	20	480	674	40	11	880	381	20
5	Mam. Yellow Intermediate	18	1,620	627	..	22	880	748	..
6	Norbiton Giant	18	960	616	..	15	1,460	524	20
7	Canadian Giant	18	740	612	20	20	1,580	693	..
8	Mam. Oval Shaped	18	80	601	20	17	1,640	594	..
9	Yellow Fleshed Tankard	18	80	601	20	13	400	440	..
10	Half Long Sugar White	16	560	542	40	12	640	410	40
11	Gate Post	16	120	535	20	14	600	476	40
12	Sutton's Prize Winner	15	800	513	20	14	1,920	498	40
13	Golden Fleshed Tankard	15	800	513	20	14	820	480	20
14	Yellow Intermediate	14	1,920	498	40	14	1,040	484	..
15	Prize Mammoth Long Red	14	1,040	484	..	17	1,200	586	40
16	Mammoth Long Red	14	1,040	484	..	12	640	410	40
17	Gate Post Yellow	14	820	480	20	13	180	436	20
18	Selected Mammoth Long Red	13	1,720	462	..	15	360	506	..
19	Wards Large Oval Shaped	13	1,720	462	..	11	1,760	396	..
20	Lion Yellow Intermediate	11	880	381	20	14	160	469	20
21	Giant Yellow Globe	10	240	337	20	11	440	374	..
22	Warden Orange Globe	9	1,580	326	20	10	1,340	355	40

EXPERIMENTS WITH CARROTS.

Nineteen varieties of carrots were tested this year. Two sowings of each sort were made, the first on April 4, the second on May 11. The land was similar in quality and preparation to that used for the mangels, and as the stand was even throughout, a heavy yield was expected, but the cut-worms attacked them and lowered the yield somewhat. Four rows of 100 feet long were sown of each variety at each sowing, and the yield computed from 66 feet of the two centre rows. The roots from both sowings were pulled on October 23.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre, 1st Plot.		Yield per Acre, 1st Plot.		Yield per Acre, 2nd Plot.		Yield per Acre, 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant White Vosges	36	160	1,202	40	31	920	1,048	40
2	Improved Short White	35	400	1,173	20	29	740	979	..
3	Half Long White	33	....	1,100	..	27	120	902	.
4	New White Intermediate	31	480	1,041	20	24	400	806	40
5	Ontario Champion	30	1,660	1,026	40	35	400	1,173	20
6	Early Gem	28	1,200	953	20	23	1,520	792	..
7	Carter's Orange Giant	27	1,440	924	..	23	1,300	788	20
8	Mammoth White Intermediate	27	120	902		20	1,580	693	..
9	Green Top White Orthe	26	806	880	..	25	1,480	858	..
10	Guerande or Ox-Heart	26	800	880	.	23	420	773	40
11	White Belgian	25	600	843	20	23	640	777	20
12	Iverson's Champion	25	160	836	..	18	960	616	..
13	White Vosges Large Short	23	420	773	40	21	1,560	726	..
14	Half Long Chantenay	20	1,580	693	.	23	1,960	782	40
15	Giant Yellow Intermediate	20	1,360	672	40	16	780	546	20
16	Scarlet Intermediate	17	1,200	586	40	12	640	410	40
17	Scarlet Altringham	16	560	542	40	19	1,380	656	20
18	Scarlet Nantes	13	400	440	..	11	880	381	20
19	Long Orange or Surrey	13	400	440	..	11	660	377	40

EXPERIMENTS WITH SUGAR BEETS.

Six varieties of sugar beets were tested this year. The soil had been ploughed in the fall of 1899, and given a dressing of stable manure which was well worked into the soil with the spade-harrow and drag. The first sowing was made April 23 and the second on May 10. The seed germinated very badly owing to the wet, cold weather, and the few plants there were up were injured so much by the cut-worms that the land was ploughed.

EXPERIMENTS WITH POTATOES.

Ninety-five varieties of potatoes were planted May 17 and 18, on a sandy loam that had a crop of clover turned under in the spring, and which was well prepared by repeated harrowings. The weather was so cold and wet for a long time after they were planted that the stand was very uneven and the growth feeble. Of some varieties not over one-half of the seed germinated, which is, in many cases, the cause of the poor crop. The yield has been calculated from the produce of two rows, 66 feet long, and average rows having been taken, a thin, uneven stand shows a poor result. The quality is, however, excellent, only a few varieties showing any rot.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Total Yield Per Acre.		Yield Per Acre of Sound.		Yield Per Acre of Rotten.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	Bush.	lbs.	
1	Reading Giant	297	..	297	..	..	..	239	..	58	..	Long, white
2	Seedling No. 230	292	36	292	36	..	..	204	48	87	48	Round, white
3	Lizzie's Pride	292	36	292	36	..	..	234	..	58	36	Long, pink
4	Early Market	280	30	280	30	..	..	210	30	70	..	Oval, rose
5	Hale's Champion	268	24	268	24	..	..	201	24	67	..	Round, white
6	Prolific Rose	250	48	250	48	..	..	211	48	39	..	Long, rose
7	Quaker City	245	18	233	..	12	18	139	..	94	..	" white
8	Northern Spy	237	36	237	36	..	..	201	48	35	48	" red
9	Rose No. 9	235	24	235	24	..	..	211	34	23	50	" "
10	Uncle Sam	232	16	232	16	..	..	174	16	58	..	Oval, white
11	Dakota Red	232	16	232	16	..	..	209	..	23	16	Long, red
12	Rural Blush	232	16	232	16	..	..	185	46	46	30	" white
13	Pride of the Market	223	53	223	53	..	..	160	53	63	..	" "
14	Vanier	212	18	212	18	..	..	180	28	31	50	" red
15	McIntyre	212	8	212	8	..	..	169	35	42	33	" pink
16	Seattle	211	12	211	12	..	..	168	58	42	14	" white
17	Brownell's Winner	211	12	211	12	..	..	158	12	53	..	" red
18	Hopeful	209	..	209	..	..	..	166	30	42	30	Oval, white
19	Vigorosa	204	38	204	38	..	..	173	58	30	40	Rose
20	American Beauty	204	38	204	38	..	..	153	..	51	38	Long, white
21	Clay Rose	198	..	198	..	..	..	118	45	79	15	" rose
22	Swiss Snow Flake	197	17	197	17	..	..	138	6	59	11	" white
23	Carman No. 1	184	48	184	48	..	..	120	..	64	48	Oval, white
24	Houlton Rose	184	48	184	48	..	..	147	48	37	..	Long, rose
25	Bovee	180	24	170	54	9	30	140	54	30	..	" "
26	Green Mountain	180	24	170	24	10	..	153	..	17	24	Oval, white
27	Early Harvest	174	54	174	54	..	..	139	54	35	..	Long, "
28	Everett	173	48	173	48	..	..	130	18	43	30	" pink
29	Early Pride	173	48	173	48	..	..	113	..	60	48	White.
30	Irish Daisy	173	48	173	48	..	..	138	48	35	..	"
31	Great Divide	173	48	173	48	..	..	87	..	86	48	"
32	Early Six Weeks	171	36	171	36	..	..	86	36	85	..	Pink
33	Troy Seedling	171	36	171	36	..	..	126	12	45	24	Red
34	Ideal	169	24	135	24	34	..	101	..	34	24	Oval, pink
35	American Wonder	169	24	169	24	..	..	67	45	101	39	Long, white
36	Early Puritan	169	24	169	24	..	..	135	..	34	24	" "
37	Polaris	169	24	169	24	..	..	126	54	42	30	" "

Agassiz, B.C. Black walnut tree, two years old when planted in spring of 1890.

POTATOES—TEST OF VARIETIES—*Continued.*

Number.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Rotten.		Yield per acre of Marketable.		Yield per acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
38	Sharpe's Seedling	168	18	168	18	..	..	117	48	50	30	Long, red
39	Penn Manor	167	12	167	12	..	..	125	12	42	..	" "
40	Country Gentleman	165	..	156	30	8	30	115	30	41	..	" pink
41	Seedling No. 7	165	..	165	..	..	..	132	..	33	..	" red
42	Livingston's Banner	165	..	156	..	9	..	100	20	55	40	" "
43	Lee's Favourite	162	48	162	48	..	..	97	24	65	24	" rose
44	Early St. George	158	24	158	24	..	..	95	..	63	24	" "
45	Early Rose	158	24	158	24	..	..	102	50	55	34	" "
46	Clarke's No. 1	158	..	158	..	..	..	108	..	50	..	Pink
47	Prize Taker	157	27	157	27	..	..	110	7	47	20	Red
48	Early Sunrise	157	27	157	27	..	..	125	27	32	..	Long, red
49	Irish Cobbler	156	54	148	54	8	00	109	54	39	..	White
50	Carman No. 3	156	12	156	12	..	..	117	..	39	..	Long, white
51	Maule's Thoroughbred	155	..	155	..	..	..	109	..	46	..	" rose
52	Ohio Junior	155	..	146	30	8	30	124	..	22	30	" "
53	Lopas White	155	..	155	.	..	..	93	.	62	..	Oval, white
54	State of Maine	154	..	154	..	..	..	92	24	61	36	
55	Bill Nye	153	27	153	27	..	..	112	..	41	27	White
56	Brown's Rot Proof	153	12	153	12	..	..	91	42	61	30	Long, red
57	Pearce's Extra Early	153	..	153	..	..	..	107	10	45	50	" rose
58	Rochester Rose	153	..	153	..	..	..	99	27	53	33	" "
59	Dreer's Standard	152	30	152	30	..	..	99	..	53	30	White
60	King of the Roses	152	30	152	30	..	..	106	45	45	45	Rose
61	Cambridge Russet	152	..	136	40	15	20	98	48	37	52	White
62	Delaware	152	..	143	30	8	30	107	30	36	..	"
63	Enormous	151	40	151	40	..	..	118	40	33	..	"
64	Money Maker	151	10	151	10	..	..	112	40	38	30	Long, white
65	Honeoye Rose	151	10	143	40	7	30	90	40	53	..	" rose
66	Rural No. 2	150	30	150	30	..	..	138	..	22	30	" white
67	Thorburn	150	30	150	30	..	..	119	30	31	..	Rose
68	Vick's Extra Early	150	15	150	15	..	..	118	45	31	30	Pink
69	Early Norther	150	15	134	40	15	35	90	..	44	40	Pink and white
70	Late Puritan	150	..	150	..	..	..	112	..	38	..	White
71	Reeve's Rose	148	30	148	30	..	..	89	..	59	30	Rose
72	White Beauty	148	30	148	30	..	..	89	..	59	30	White
73	Soudan	146	..	146	..	..	..	75	..	71	..	Russet.
74	Twentieth Century	146	..	146	..	..	..	98	40	47	20	
75	Chicago Market	145	30	145	30	..	..	114	30	31	..	Red
76	General Gordon	145	..	137	45	7	15	82	20	55	25	"
77	Sir Walter Raleigh	143	45	143	45	..	..	120	45	23	..	White
78	Flemish Beauty	143	45	143	45	..	..	100	30	43	15	Rose
79	Harvest King	142	30	134	40	7	50	85	30	57	10	
80	Beauty of Hebron	142	..	142	..	..	..	85	12	66	48	Rose
81	Wonder of the World	142	..	127	30	14	30	73	..	54	30	Pink
82	Earliest of All	141	45	126	45	15	..	85	..	41	45	White
83	Gem of Aroostook	143	..	143	..	..	..	84	30	58	30	Pink
84	Early Ohio	143	..	143	..	..	..	83	..	60	..	"
85	Pearce's Prize Winner	142	30	128	..	14	30	96	..	32	..	Rose
86	Seneca Beauty	142	30	135	30	7	30	74	30	61	..	"
87	Burnaby Seedling	142	..	126	..	16	..	62	..	62	..	"
88	Columbus	141	30	141	30	..	..	99	30	42	..	Pink
89	Holborn Abundance	141	..	141	..	..	..	105	30	35	30	White
90	American Giant	140	..	127	..	13	..	84	..	43	.	"
91	Daisy	140	..	140	..	..	..	75	..	65	..	Rose
92	I. X. L.	138	30	138	30	..	..	82	48	55	42	Pink
93	Burpee's Extra Early	138	..	138	..	..	..	82	..	56	..	Rose
94	Empire State	136	..	136	..	..	..	78	..	58	..	Pink and whi
95	New Variety, No. 1	131	30	117	45	13	45	67	..	50	45	White
96	New Queen	130	..	117	30	12	30	78	..	39	30	Pink
97	Maggie Murphy	127	..	121	..	6	..	63	30	58	30	Rose
98	Early White Prize	127	..	119	30	7	30	70	12	49	18	White

EXPERIMENTS WITH FODDER PLANTS.

The following fodder plants were tested again this year. The Japanese millet being a strong grower, and the stalks very leafy, was sown in drills 9 inches apart; all the others were sown in drills 7 inches apart. The soil was a warm loam, which had produced a crop of potatoes in 1899, and was in good condition. The weather was so wet when the crops were cut that they were put into the silo, it being impossible to cure them. The Japanese millet is the best and most valuable of this class of plants, so far tested here, being a strong grower with long heavy heads and the stalks are very leafy, and it is readily eaten by all kinds of stock.

The Soja bean is also a very valuable fodder plant.

All were sown May 15, and cut October 11.

MILLETS.

Plot 1—Japanese Millet :—
Length of stalk, 40 to 48 inches.
Length of head, 3½ to 8 inches.
Yield when cuc green, per acre, 7 tons.

Plot 2—Golden Millet :—
Length of stalk, 26 to 30 inches.
Length of head, 2½ to 6 inches.
Weight when cut green, per acre, 5 tons 1,120 pounds.

Plot 3—Italian Millet :—
Length of stalk, 30 to 36 inches.
Length of head, 6 to 8 inches.
Weight per acre, cut green, 5 tons 1,600 pounds.

Plot 4—White Round Extra French :—
Length of stalk, 24 to 28 inches.
Length of head, 2½ to 3 inches.
Weight per acre, cut green, 3 tons 1,600 pounds.

Plot 5—Early Pearl :—
Length of stalk, 32 to 36 inches.
Length of head, 4 to 6 inches.
Weight per acre, cut green, 3 tons 1,440 pounds.

Plot 6—Pearl Millet :—
Length of stalk, 32 to 36 inches.
Length of head, 3½ to 6 inches.
Weight per acre, cut green, 4 tons 800 pounds.

Plot 7—Hungarian Grass :—
Length of stalk, 34 to 36 inches.
Length of head, 3 to 5 inches.
Weight per acre, cut green, 5 tons 120 pounds.

SOJA BEANS.

Three plots of this bean were sown in drills, one at 21 inches apart, one at 28 inches, and one at 35 inches.

The medium distance, or 28 inches, appears to be about right here, unless the land is very fertile, when it would be better drilled in at 35 inches apart. Being

very leafy, if sown to suit the conditions of the soil, it soon shades the ground, and if kept clean of weeds up to that period of growth, there is very little trouble from this source until it is ready to cut. If cut when the bean is just full grown, it makes very rich feed. All were cut October 11.

Plot 1.—Sown May 1. Drills 21 inches apart. Length of stalks, 28 to 32 inches ; very leafy and with many pods. Weight when cut, 3 tons 360 pounds.

Plot 2.—Drills 28 inches apart. Sown May 1. Length of stalk, 28 to 34 inches ; fairly well podded. Weight when cut, 3 tons 1,440 pounds.

Plot 3.—Drills 35 inches apart. Sown May 1. Length of stalk, 28 to 34 inches ; fairly well podded. Weight when cut, 2 tons 1,540 pounds.

HORSE BEANS.

Plot 4—English Horse Beans.—Planted May 1, in drills 21 inches apart. Height of stalks, 28 to 32 inches. Yield per acre, 1 ton 880 pounds. A poor uneven stand, and the cut-worms injured them, cutting off the foliage and many of the blossoms.

Plot 5—Horse Beans.—Drills 28 inches apart. Planted May 1. Height 28 to 36 inches. Yield per acre, 1 ton 1,280 pounds.

Plot 6—Horse Beans.—Drills 35 inches apart. Planted May 1. Height of stalk, 30 to 36 inches. Yield per acre, 1 ton 1,440 pounds. All these horse beans suffered from the cut-worms.

SORGHUM.

Early Amber Sugar Cane.—Sown May 29, in drills 28 inches apart. The seed did not germinate, and the land was afterwards sown to mixed grains for fodder.

Early Orange Sugar Cane.—Sown same date as Early Amber, but like that variety it did not germinate. The land was afterwards ploughed and sown to other crop.

BROOM CORN.

Two plots of broom corn were sown in drills, one at 21 inches apart in the drill and the other at 28 inches, on June 1. The soil was a warm loam, but the continued rains during June prevented the germination of the seed. Only a few feeble plants came up and the land was afterwards ploughed and sown with other crops.

PASPALUM DILATATUM.

A small plot of this grass from Australia was sown May 31 with a nurse crop. It is at this date a fairly thick stand and looks promising

SAND VETCH.

A plot of this forage plant was sown May 11, on rich, well prepared loam, drilled in at the rate of 90 pounds of seed per acre. The seed germinated well and the plants made a fair growth, but the stalks are very slender and the leaves small, and when cured it is very light and like moss. The cattle did not care for it either green or cured.

	Tons.	Lbs.
Yield per acre, green....................	5	640
Yield per acre, cured	1	1,580

EXPERIMENTS WITH BUCKWHEAT.

Plots of one-tenth of an acre each of Silver Hull, Japanese and Grey buckwheat were sown May 19. All grew finely and were very promising, blooming profusely, and grain forming, when the cut-worms attacked them and in two days there was not a leaf or blossom left.

MIXED GRAINS FOR FEED.

Plots of a quarter of an acre each were sown with the following mixtures on May 11, and cut when the oats were in the early dough stage :—

Mixture No. 1.—One bushel each of oats, pease and barley.

Mixture No. 2.—One bushel each of oats, pease and wheat.

Mixture No. 3.—One bushel each of grass pea, oats and barley.

	Tons.	Lbs.
Mixture No. 1.—Yield per acre when cut.	8	320
Yield per acre when cured	3	1,560
Mixture No. 2.—Yield per acre when cut	7	1,880
Yield per acre when cured	3	1,120
Mixture No. 3.—Yield per acre when cut	7	1,440
Yield per acre when cured	3	1,360

EXPERIMENTS WITH GRASSES.

The plots sown with different varieties of Bromus in the spring of 1899, did not amount to very much this season. The wet spring which favoured other grasses and clovers did not appear to suit them.

As reported in 1899, Bromus Inermis made a thick sod last year, but many plants were dead this spring and clover came in, and the crop although a light one was more clover than Bromus Inermis.

Bromus Schraederi.—This grass was nearly all dead when growth began in spring and the crop cut off the plot was more than three-quarters clover.

Bromus giganteus.—This was very patchy, very few stools having come through the winter. Clover, however, came in freely and a small crop of hay was got from it.

Clover Seed inoculated with Nitragin.—One acre of clover was sown in the spring of 1899 with seed treated with nitragin, and ordinary seed clover was sown in the remainder of the field on three sides of it. Nitragin does not appear to add to the crop or be needed in the lower mainland of British Columbia. The yield of one acre of the first crop from the treated seed and one acre alongside of untreated were cut and weighed. The weather was so showery that no attempt was made to cure the clover, all was put into the silo.

	Tons.	Lbs.
Weight of 1 acre, untreated.	9	1,870
Weight of 1 acre, treated	9	1,980

The land where this crop grew is a gravelly loam, and as it has been in crop and cultivation for some years, it was all practically alike, and the comparison may be considered a fair one.

EXPERIMENT WITH CANARY SEED.

A plot of this seed was sown April 24. The seed did not germinate freely and the stand was thin and the crop poor.

Length of stalk, 24 to 30 inches ; length of head, 1 to 1¼ inches.

Cut August 27—Weight green, 1 ton, 160 pounds ; yield of seed per acre, 420 pounds.

EXPERIMENT WITH SPELTZ WHEAT.

An experimental plot of this grain was sown May 11. It grew vigorously and does not appear to be subject to either rust or smut. Ripe August 18.

Days to mature.	Length of straw. Inches.	Head.	Gross weight. tons.	lbs.	Grain. lbs.
99	48	2½	2	80	1,340

DISTRIBUTION OF SEED SAMPLES.

The following packages were distributed to applicants in the spring :—

Packages of trees and shrubs	280
Three-pound packages of wheat	41
" " oats	68
" " pease	73
" " barley	36
" " potatoes	284
Packages of tree seeds and nuts	83
Packages of bulbs	106

SUMMARY OF FORAGE CROPS HARVESTED.

	Tons.	Lbs
Clover hay	63	265
Mixed grains cured for hay	37	1,000
Clover ensilage	75	....
Corn ensilage	15	1,600
Turnips	18	1,700
Mangels	8	600
Carrots	9	325
Total	227	1,140

OATS TREATED WITH COMMERCIAL FERTILIZERS.

These plots were on a fairly strong clay loam that had produced a crop of pease in 1899, following clover, and evidently did not benefit much from the nitrate of soda. The dressing of superphosphate on plot No. 3 was a little too heavy, as the crop was badly lodged, and difficult to harvest. The muriate of potash did not have time to do as much good as it should have done, if it had been applied earlier in the season, but the straw on plot 5 was very stiff and bright, and the grain plump, as was that of plot 6, where a little dressing of each of the fertilizers was used. There was no rust or smut on any of the plots.

OATS—FERTILIZER TESTS.

Name of Variety.	Plot.	Quantity of Fertilizer used per Acre.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.		Yield per Acre.		Weight per Bushel.
				In.		In.	Tons.	Lbs.	Bush.	Lbs.	Lbs
Lincoln	1	100 lbs. nitrate of soda..	111	38	Medium..	8	2	1000	46	16	35
"	2	200 " "	113	40	Weak	8	3	800	60	00	$34\frac{3}{4}$
"	3	400 " superphosphate	113	48	Medium..	10	4	240	97	2	$35\frac{1}{2}$
"	4	No fertilizer	113	40	Weak... .	8	2	600	44	14	$34\frac{1}{3}$
"	5	200 lbs. muriate of potash...	113	42	Medium..	10	2	1800	53	8	$35\frac{3}{4}$
"	6	100 " mur. of pot., 100 lbs. nit. of soda, 200 lbs. superphos. .	113	46	Strong ...	10	3	1800	71	6	$36\frac{3}{4}$

FORMALIN AND MASSEL POWDER AS PREVENTIVES FOR SMUT.

One variety of oats and two varieties of barley were used in the tests with Formalin. The seed of each sort for five plots was treated with a solution of Formalin in different ways and of different strengths and the seed for the 6th plot was left untreated as a check plot.

The Massel powder test was used on one variety of oats only, the seed of which was used for plot No. 7. That for No. 8 was left untreated as a check plot. The seed used in each case was considerably affected with smut. The following results were obtained :—

OATS—TREATED FOR SMUT.

Number of Plot.	Name of Variety Sown.	Treatment.	Percentage of Good Heads.	Percentage of Smutty Heads.
1	Doncaster Prize. ...	Formalin $4\frac{1}{2}$ oz. to 10 galls. water ; soaked 1 hour.... ...	$21\frac{1}{2}$	$78\frac{1}{2}$
2	" ...	" " " 15 minutes.....	20	78
3	" ...	" " " 5 "	20	80
4	"	" " " sprinkled	$23\frac{1}{2}$	$76\frac{1}{2}$
5	"	" 9 " " sprinkled......	21	79
6	" ...	Check plot ; untreated.......	$27\frac{1}{2}$	$72\frac{1}{2}$
7	Wide Awake........	Massed powder 4 oz., lime 2 lbs., water 2 galls. ; sprinkled	$10\frac{3}{4}$	$89\frac{1}{4}$
8	" ...	Check plot untreated	$26\frac{1}{2}$	$73\frac{1}{2}$

BARLEY—TREATED FOR SMUT.

Number of Plot.	Name of Variety Sown.	Treatment.	Percentage of Good Heads.	Percentage of Smutty Heads.
1	Odessa	Formalin $4\frac{1}{2}$ oz. to 10 galls. water; soaked 1 hour	$21\frac{1}{4}$	$87\frac{3}{4}$
2	"	" " " " 15 minutes	$11\frac{1}{2}$	$88\frac{1}{2}$
3	"	" " " " 5 "	12	88
4	"	" " " sprinkled	14	86
5	"	" 9 " " "	12	88
6	"	Check plot; untreated	18	82
7	Canadian Thorpe	Formalin $4\frac{1}{2}$ oz. to 10 galls. water, soaked 1 hour	13	87
8	"	" " " " 15 minutes	19	81
9	"	" " " " 5 "	$17\frac{1}{2}$	$82\frac{1}{2}$
10	"	" " " sprinkled	21	79
11	"	" 9 oz. " "	20	80
12	"	Check plot; untreated	25	75

FIELD BEANS.

Four varieties of beans were sown April 30, in drills 2 feet apart, on plots of one-fortieth acre each. The soil was a warm loam and the seed germinated well and, with the exception of the Mexican tree bean, were very promising until the cut-worm attacked them, cutting off the foliage and green pods, seriously damaging the crop.

FIELD BEANS—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield per Acre. Bush.	Yield per Acre. Lbs.
White Marrowfat	April 30	Sept. 25	148	17	20
White Field Medium	" 30	" 28	151	19	
Mexican Tree	" 30	No pods formed.			
California Pea	" 30	Sept. 27	150	15	30

EXPERIMENTS WITH FLAX.

The experiments with flax were conducted on the same lines as those of last season. Eight plots were sown in sets of two each; one plot in each case being sown at the rate of 40 pounds per acre and the other at double that quantity, or 80 pounds per acre.

The first set was sown April 24 and the other sets following at intervals of a week each. The object being to gain information as to the best time to sow and the amount of seed to sow to get the best results. The land was fair in quality and in good condition. The crop was cut with a scythe and in consequence the gross weight is less than if it had been pulled.

Flax.	Pounds of Seed per acre.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Gross Weight of Straw and grain per acre.	Yield of Seed per Acre.	
					Inches.	Lbs.	Bush.	Lbs.
Plot 1	40	April 24	August 9	107	30 to 36	1,920	8	32
Plot 2	80	" 24	" 9	107	28 " 32	1,600	11	4
Plot 3	40	May 1	" 13	104	30 " 36	1,840	7	8
Plot 4	80	" 1	" 13	104	28 " 32	1,680	9	16
Plot 5	40	" 8	" 18	102	30 " 00	1,360	7	18
Plot 6	80	" 8	" 18	102	26 " 28	1,160	7	48
Plot 7	40	" 15	" 21	98	30 " 00	1,440	6	54
Plot 8	80	" 15	" 21	98	28 " 00	1,240	7	38

APPLES.

As the apple trees had almost, without exception, made a fine vigorous growth and borne very light crops in 1899, and the winter had been mild and favourable, a full crop was expected this year on all trees that had previously borne and a few on many trees of varieties which had not yet produced fruit. The old trees as well as many young ones bloomed profusely, but the cold north and north-west winds, cold rains and several light frosts prevented proper fertilization, consequently a large share of the bloom fell and the crop on the whole was very light and uneven. The continuous rains of April, May and June prevented the spraying mixtures having the proper effect, therefore, funguous diseases have been unusually prevalent, hence many scabby apples.

The following varieties fruited for the first time this year and some of them are promising in their season :—

Like all other fruits, apples are from two to three weeks earlier in ripening this year than usual and of inferior quality and appearance. The fruit dropped from the trecs, in some cases, before it was fully matured.

Lebedka.—Tree a strong and vigorous grower. Fruit below medium size, roundish, conical ; skin greenish-yellow, with splashes of red on the sunny side. Flesh yellowish, juicy, slightly acid, quality poor. Season, last of July.

Gruschovka.—Tree a vigorous grower. Fruit of medium size, oblate, conical ; skin pale greenish-yellow with a few small red streaks. Flesh white, juicy, crisp, mildly acid, and pleasant. Season, early August.

Stone's Eureka.—Tree a vigorous grower. Fruit of medium size, oblate, conical ; skin greenish-yellow with patches of russet. Flesh white, juicy, crisp, mildly sub-acid and pleasant. Season, August.

Carmelite Reinette.—Tree a vigorous grower and early bearer. Fruit large, irregularly conical ; skin pale yellowish-green. Flesh tender, white, not juicy, nearly sweet. Season, early August.

Early Sweet.—Tree a vigorous grower. Fruit large, conical ; skin, yellow with a little russet about the stem. Flesh yellow, soft, sweet, not very juicy, but of very good flavour. Season, early August.

Kremer Glass.—Tree a strong grower. Fruit of medium size, globular ; skin clear, waxy, yellow, with many small patches of bright red on cheek. Flesh white ; a brisk acid, juicy, with a pleasant flavour. Season, August.

Frogmore Prolific.—Tree a vigorous grower. Fruit large, roundish, conical; skin greenish, with a dull red blush. Flesh firm, crisp, white, juicy, a little course, mildly acid. Season, early September.

Kentish Codlin.—Tree a strong grower, and early bearer. Fruit, large, oblong, conical, irregularly ribbed ; skin greenish-yellow. Flesh coarse, white, crisp, moderately juicy and acid. Season, September.

Prince Albert of Prussia.—Tree a vigorous grower, and early bearer. Fruit above medium size, flattish, globular ; skin greenish-yellow, nearly covered with bright red, and a little russet. Flesh greenish-white, crisp, juicy, subacid, of good flavour. Season, September.

Boskoop Calville.—Tree a strong and vigorous grower. Fruit below medium size, oblate, tapering to eye ; skin pale green, nearly covered with reddish-orange. Flesh yellowish, not juicy, mildly acid, of poor quality. Season, September.

Lyman's Seedling.—Tree a vigorous grower. Fruit above medium size, conical ; skin yellowish-green, with a bright red cheek. Flesh white, juicy, mildly acid, of poor quality. Season, September.

Ecklinville Seedling.—Tree a strong grower. Fruit very large, flat round ; skin green with a dull russet red cheek and sprinkled with russet dots. Flesh white, juicy, crisp, mildly acid, of fine flavour ; quality good. Season, September.

Langton's.—Tree a vigorous grower. Fruit medium size, globular ; skin green freely splashed with red. Flesh white, crisp, subacid, and of pleasant flavour. Season, September.

Okabena.—Tree a vigorous grower. Fruit of medium size, oblate ; skin greenish white, nearly covered with deep red. Flesh white, crisp, juicy, of a mild, pleasant subacid character. Season, September.

Kirkbridge.—Tree a medium grower. Fruit small, conical ; skin greenish white. Flesh white, mildly acid, juicy, with a pleasant flavour. Season, September.

Golden Merienwerder.—Tree a strong grower. Fruit medium to large, oblong, slightly ribbed ; skin greenish-yellow. Flesh white, juicy, crisp, subacid. Season, September.

Dantzic Kant.—Tree a strong grower. Fruit above medium size, roundish, irregular ; skin green splashed with reddish-bronze and a little russet. Flesh white, crisp, juicy, subacid, with a pleasant flavour. Season, September.

Walworth Pippin.—Tree a strong grower. Fruit large, roundish, irregularly tapering ; skin yellowish green, with dull reddish cheek and freely sprinkled with small white dots. Flesh white, crisp, juicy, subacid. Season, September.

Voronesh Reinette.—Tree a vigorous grower. Fruit large, roundish conical ; skin yellowish-white, with a deep red blush nearly over the whole surface. Flesh white, juicy, of a mild, pleasant acid character. Season, September.

Charlemoff.—Tree a strong grower. Fruit of medium size, globular, slightly tapering to eye ; skin greenish-yellow, freely splashed with two shades of red. Flesh white, not juicy, firm, subacid. Season, September.

Aport, 252.—Tree a strong grower. Fruit large, oblong, globular ; skin clear yellow. Flesh white, crisp, juicy, slightly acid, with a pleasant flavour. Season, September.

Knevskoe.—Tree a vigorous grower. Fruit of medium size, irregular globe-shape; skin yellowish-white, with a faint blush on sunny side. Flesh white, moderately juicy, crisp, subacid. Season, September.

Kursk Reinette.—Tree a medium grower. Fruit large, oblong, of an irregular shape ; skin green, nearly covered with russet. Flesh white, crisp, juicy, a little coarse, inclined to water core. Season, September.

Summer Pearmain.—Tree a strong grower. Fruit small, oblong, tapering ; skin dull green with a dark red blush. Flesh greenish-white, firm, not juicy, of poor quality. Season, September.

Duchovoe.—Tree a strong upright grower. Fruit large, oblong; skin light yellow, freely splashed and mottled with light and dark red. Flesh crisp, juicy, white, a little coarse, pleasantly subacid. Season, early September.

Voronesh No. 9.—Tree a medium grower. Fruit above medium size, globular conical, somewhat ribbed. Skin greenish-yellow, with a little pale red on cheek. Flesh white, crisp, rather coarse, juicy, pleasantly subacid. Season, September.

Golden White.—Tree a strong grower. Fruit large, globular tapering to eye. Skin greenish-yellow, with a little red on cheek. Flesh white, crisp, not juicy, of a mild, pleasant acid character. Season, September.

Simbirsk No. 10.—Tree vigorous and productive. Fruit of medium size, roundish conical. Skin yellow, freely splashed and striped with bright red. Flesh yellowish, crisp, not juicy, subacid with a pleasant flavour. Season, September.

Cox's Pomona.—Tree a medium grower. Fruit large oblate, slightly tapering to eye, ribbed. Skin yellowish, striped and splashed with red in two shades. Flesh coarse white, juicy subacid. Season, September.

Queter.—Tree a strong grower. Fruit of medium size, oblate. Skin greenish-white with a faint blush and a little russet about the stem. Flesh a little coarse, white, not juicy, subacid. Quality, poor. Season, early October.

Sklanka.—Tree a vigorous grower. Fruit above medium size, conical. Skin green with a faint blush in the sun. Flesh white, crisp, juicy, mildly subacid. Season, October.

Stone Antonovka.—Tree a medium grower. Fruit large, oblong conical. Skin greenish-yellow. Flesh yellowish white, crisp, juicy, pleasantly subacid. Season, October.

Tyrrestrup.—Tree a vigorous grower. Fruit large, oblong globe-shaped. Skin green with sometimes a faint blush. Flesh white, juicy, pleasantly subacid. Season, October.

Harbert's Reinette.—Tree a strong grower. Fruit above medium size, roundish conical. Skin greenish-yellow, splashed with russet. Flesh white, crisp, juicy, mildly acid, with a pleasant flavour. Season, October.

Cross Voronesh.—Tree a strong grower. Fruit of medium size, oblong, globular, irregularly ribbed. Skin greenish-white with patches of russet. Flesh white, crisp, coarse, mildly acid, of medium quality. Season, October.

No. 569.—Tree a vigorous grower. Fruit above medium size, oblong, slightly conical, ribbed. Skin green with a dull red cheek. Flesh white, juicy, mildly acid with a pleasant flavour. Season, October.

Romenskoe.—Tree a vigorous grower. Fruit large oblate, tapering a little to the eye, irregular in shape. Skin greenish-yellow with a red cheek. Flesh white, crisp, moderately juicy, of a pleasant subacid character. Season, October.

Garfield.—Tree a strong grower. Fruit of medium size, globular, conical. Skin yellowish-green, with an orange-reddish cheek. Flesh white, juicy, subacid, firm, with a pleasant flavour. Season, October.

Belmont.—Tree a medium grower. Fruit above medium size, roundish, conical. Skin greenish-yellow with a faint blush. Flesh white, crisp, subacid, with a pleasant flavour. Season, November and December.

Owen Jones.—Tree a strong grower and early bearer. Fruit above medium size, roundish oblong, tapering slightly to the eye. Skin dull green, freely splashed with dull red. Flesh yellow, firm, moderately juicy, of medium quality. Season, November and December.

Hare Pipka.—Tree a vigorous grower. Fruit of medium to large size, globular. Skin, greenish-yellow, with a dull red blush. Flesh white, crisp, juicy, subacid. Season, November.

Ragan's Yellow.—Tree a strong grower. Fruit of medium size, roundish conical. Skin greenish-yellow, with splashes of russet and a dull orange cheek. Flesh yellowish, firm, moderately juicy, pleasant, subacid, quality good. Season, November.

Lady Elgin.—Tree a strong grower. Fruit of medium size, roundish, flat. Skin green, with a little russet and a bronze cheek, smooth and clean. Flesh white, crisp, juicy subacid. Season, December and January.

Hebble White.—Tree a vigorous grower. Fruit of medium size, oblate. Skin green, nearly covered with russet. Flesh greenish-white, crisp, moderately juicy, with a pleasant flavour. Season, winter.

Oxford Peach.—Tree a strong grower. Fruit below medium size, roundish, slightly conical. Skin green, with a dull red cheek. Flesh yellowish, crisp, pleasantly subacid. Season, winter.

Colfax.—Tree a vigorous grower. Fruit large, roundish, conical. Skin yellow, nearly covered with light red splashed and mottled with crimson. Flesh white, juicy, crisp, subacid, with a pleasant flavour. Season, early winter.

McEwen's Sweet.—Tree a free grower. Fruit small to medium size, oblong. Skin yellow, with grayish dots. Flesh white, crisp, juicy, with a pleasant flavour, sweet. Season, November to January.

Red Aberdeen.—Tree a strong grower. Fruit of medium size, conical. Skin greenish-yellow, almost covered with deep red. Flesh white, crisp, juicy, mildly acid, with a pleasant flavour. Season, winter.

Heatherbell.—Tree a strong grower. Fruit of medium size, roundish, oblate. Skin greenish-yellow, with a splashed and striped blush. Flesh crisp, white, juicy, with a sprightly pleasant flavour. Season, winter.

Clayton.—Tree a medium grower. Fruit below medium size, oblate. Skin green, with a reddish blush, rather scabby. Flesh white, not juicy, quality fair. Season, winter.

Gano.—Tree a strong grower. Fruit above medium size, broadly conical. Skin green, nearly covered with a dull red. Flesh white, firm, moderately juicy, mildly subacid. Season, winter.

Crown Prince Rudolph of Austria.—Tree a strong grower. Fruit above medium size, oblate. Skin russet green, nearly covered with dull red. Flesh yellowish, firm, moderately juicy, of a pleasant subacid character. Quality, good. Season, October.

Ozark.—Tree a medium grower. Fruit of medium size, oblong globular. Skin greenish-russet with a dull reddish cheek. Flesh greenish-white, firm, not very juicy, mildly subacid. Season, winter.

Alant.—Tree a strong grower. Fruit of medium size, oblong, tapering to the eye. Skin green with a few splashes of dull red. Flesh crisp, juicy, of a mild, pleasant acid character. Season, winter.

Beauty of Pontoise.—Tree a vigorous grower. Fruit large, roundish oblate and sometimes ribbed. Skin green, sprinkled with small whitish dots and splashed with dull red. Flesh whitish, crisp, juicy pleasantly subacid. Season, winter.

Striefling.—Tree a vigorous grower. Fruit small to medium in size, globular. Skin green, nearly covered with stripes and splashes of two shades of red. Flesh white, crisp, juicy, with a pleasant flavour. Season, winter.

Zuccalmaglio's Reinette.—Tree a strong grower. Fruit of medium size, oblong. tapering a little to the eye. Skin green, freely sprinkled with small white dots and with a faint pink blush on sunny side. Flesh white, firm, juicy, subacid. Season, winter.

Minister.—Tree a strong grower. Fruit below medium size, globular. Skin green, nearly covered with small splashes and stripes of red. Flesh juicy, firm, white. Season, winter.

Tuft's Baldwin.—Tree a strong grower. Fruit large, globular. Skin nearly covered with dull red and many white dots. Flesh yellowish-white, crisp, mildly subacid with a pleasant flavour. Season, early winter.

Gaesdonker Gold Reinette.—Tree a vigorous grower and an early bearer. Fruit of medium size, globular, somewhat oblique. Skin greenish-yellow, with a dull red cheek, sprinkled with gray dots. Flesh whitish, moderately juicy, crisp, mildly acid, with a pleasant flavour. Free from scab. Season, winter.

Bohemian Favourite.—Tree a medium grower. Fruit of medium size, oblong conical. Skin smooth, yellowish white, with a bright red cheek. Flesh white, juicy, crisp, nearly sweet, with a pleasant flavour. Season, winter.

English Winter Calville.—Tree a medium grower. Fruit of medium or below medium size, globular. Skin smooth, clean, greenish-yellow, with a dull red cheek. Flesh, white, moderately juicy, crisp, mildly acid, with a pleasant flavour. Season, winter.

Berk's Reinette.—Tree a strong grower and early bearer. Fruit small and inclined to be scabby. Skin yellow, sprinkled with gray dots and with a red cheek. Flesh white, moderately juicy, crisp, mildly subacid, with a pleasant flavour. Season, winter.

Steward's Golden.—Tree a medium grower. Fruit of medium size, oblate. Skin smooth, greenish-yellow, with a dull red cheek. Flesh white, crisp, juicy, of a mild pleasant acid character. Season, winter.

Reinette Ananas.—Tree a strong grower and an early bearer. Fruit of medium size, globular, tapering a little to the eye. Skin yellow, freely sprinkled with small

green dots. Flesh white, crisp, juicy, pleasantly subacid ; quality, good. Season, winter.

Lincolnshire Red Coat.—Tree a strong grower and an early bearer. Fruit large, conical. Skin greenish-yellow, with a bright red cheek, and a little russet near the stem and a few gray dots. Flesh white, crisp, juicy, sweet, of fine flavour. Season, winter.

Lichtenwalder.—Tree a strong grower. Fruit of medium size, globular. Skin greenish-yellow, with a bronze-reddish cheek. Flesh greenish-yellow, firm, crisp, moderately juicy of a pleasant, mild acid character. Season, winter.

Kossuth.—Tree a medium grower. Fruit small, oblate. Skin russet green, sprinkled with gray dots and with a bronze cheek. Flesh white, firm, moderately juicy, aromatic, of a mild, pleasant acid character. Season, winter.

London Pippin.—Tree a strong grower and an early bearer. Fruit of medium size, rather flat, irregular. Skin clear yellow, with a dark red blush on the sunny side. Flesh yellow, juicy, crisp, pleasantly acid. Season, winter.

Red Stettin.—Tree a vigorous grower and an early bearer. Fruit large, oblate, ribbed. Skin greenish-yellow, with a dull red cheek. Flesh greenish-yellow, firm, not very juicy, pleasantly subacid. Season, winter.

Pound Sweet.—Tree a strong grower. Fruit large, oblong, ribbed. Skin greenish-yellow, with a little red on sunny side. Flesh greenish-white, not very juicy, sweet. Season, winter.

Marshall's Seedling.—Tree a vigorous grower and an early bearer. Fruit above medium size, conical. Skin yellowish-white, with a few gray dots and a pinkish blush. Flesh white, firm, crisp, juicy, pleasantly subacid. Season, winter.

Fraser River Beauty.—This variety is in every respect identical with Striped Astrachan and should be dropped off the list.

Williams' Early.—This variety is identical in growth of tree, appearance of fruit, time of ripening and quality with the Yellow Transparent, and the name Williams' Early may also be dropped off the list.

PEARS.

All of the older or longest planted pear trees bloomed freely this year, but very few set fruit. The Bartlett, Keiffer, Dr. Jules Guyot, Rivers Princess and Vicar of Winkfield, gave fair crops, but very few of the other trees gave more than a dozen or two of inferior samples.

The following varieties fruited for the first time this year:—

Early Duchess.—Tree a strong grower and an early bearer. Fruit above medium size, obtuse pyriform; skin greeish-yellow, with a bronze reddish cheek and a few gray dots. Flesh coarse, not juicy, sweet, with a pleasant flavour. Season, early September.

Beurre Six.—Tree a vigorous grower, and an early bearer. Fruit small, pyriform; skin pale yellow with a few green dots. Flesh whitish, juicy, melting, vinous. Season, September.

René Dunan.—Tree a strong grower. Fruit large, obtuse pyriform; skin yellowish green, sprinkled with gray dots and splashed with russet. Flesh a little coarse, whitish, juicy, sweet, with a pleasant flavour. Season, late September.

Hohensaten.—Tree a medium grower. Fruit of medium size, obtuse pyriform; skin yellow, with a faint blush, and freely sprinkled with gray dots. Flesh white, juicy, buttery, nearly sweet, of very fine flavour. Season, late September.

Epine d'Eté.—Tree a medium grower. Fruit of medium size pyriform; skin pale yellow. Flesh tender, sweet, musky. Season, September.

Frederick Clapp.—Tree a vigorous and spreading grower. Fruit of medium size, roundish pyriform; skin smooth yellow, with a few brown dots. Flesh yellowish, juicy, with a rich fine flavour. Season, October.

Douillard.—Tree a medium grower. Fruit large, obovate, obtuse, pyriform; skin pale yellow, traced with russet. Flesh white, fine-grained, juicy, slightly vinous. Season, October.

Cole's Seedless.—Tree a strong grower. Fruit small to medium, obtuse, pyriform; skin yellow with patches of russet and a few brown dots. Flesh fine-grained, whitish, juicy, sweet and pleasant. Season, October.

Brockworth Park.—Tree a medium grower. Fruit above medium size, obtuse, pyriform; skin smooth, pale yellow with a faint blush. Flesh white, juicy, buttery, vinous, rich. Season, last of October.

Garber.—Tree a strong grower and productive. Fruit of medium size, obtuse pyriform; skin greenish yellow, with gray dots, very similar to Keiffer in quality and season.

Lucy Duke.—Tree a moderate grower. Fruit large, pyriform; skin a reddish russet. Flesh whitish, juicy, sweet and pleasant. Season, October.

Hoosie.—Tree a vigorous grower. Fruit large roundish, pyriform; skin clear yellow, with a little russet and sprinkled with russet dots. Flesh whitish, juicy, melting rich aromatic, quality good. Season, October.

Jones' Seedling.—Tree a vigorous grower. Fruit below medium size, pyriform; skin deep yellow, with russet patches and a few dots. Flesh granular, sugary, vinous. Season, October.

Soldat Laboreur.—Tree a medium grower. Fruit of medium size, roundish, pyriform; skin yellow, with patches and dots of russet. Flesh yellowish, granular, moderately juicy, sweet and perfumed; quality good. Season, October.

Figue d'Alençon.—Tree a strong grower. Fruit above medium size, oblong, pyriform ; skin greenish-yellow, with a brownish red cheek, and many russet dots. Flesh greenish-white, juicy, melting, sweet, slightly vinous. Season, October and November.

Forelle.—Tree a strong grower. Fruit small to medium, obovate, pyriform ; skin yellow, with a red cheek and a few crimson dots. Flesh white, fine grained, buttery, slightly vinous; quality good. Season, November.

Reeder.—Tree a vigorous grower. Fruit small, pyriform; skin yellow, with patches of russet, and many russet dots. Flesh whitish, fine grained, juicy, melting, sweet and pleasant, perfumed. Season, November.

Louise Vilmorin.—Tree a strong grower, and an early bearer. Fruit of medium size, obtuse, pyriform; skin yellow with considerable russet and many russet dots, and a dull red cheek. Flesh white, fine grained, juicy, melting and sweet; quality good. Season, November.

Beurre d'Aremberg.—Tree a moderate grower. Fruit of medium size, obovate; skin pale greenish-yellow, with tracings and spots of russet. Flesh white, buttery, juicy, with a rich vinous flavour. Season, November.

Beurre Rance.—Tree a medium grower. Fruit of medium size, obtuse, pyriform; skin dull green, dotted with many russet dots. Flesh greenish-white, melting, juicy and rich; quality good. Season, December.

P. Barry.—Tree a strong grower. Fruit large, long pyriform, slightly obtuse; skin deep yellow, nearly covered with golden russet. Flesh whitish, fine-grained, juicy, melting, sweet and of fine quality. Season, December.

Marie Benoist.—Tree a moderate grower. Fruit large, obtuse, pyriform; skin dull yellow, nearly covered with russet. Season, December.

Bergamot d'Esperen.—Tree a vigorous grower. Fruit of medium size, oblate, globular ; skin greenish-yellow, with patches of russet and many russet dots. Flesh greenish-yellow, juicy, buttery, sweet ; quality, very good. Season, December.

Dana's Hovey.—Tree a vigorous grower. Fruit small, obovate, obtuse, pyriform ; skin pale yellow, with small patches of russet and many russet dots. Flesh yellowish, juicy, fine grained, with a rich sweet flavour. Season, December.

Prevost.—Tree a vigorous grower. Fruit of medium size, obovate, pyriform ; skin pale yellow, with a faint blush in the sun and sprinkled with small brown dots. Flesh white, juicy, a little coarse, but sweet and of a pleasant flavour. Season, winter.

PLUMS.

The plum trees commenced to blossom early in March this year, and those that were in bloom very early were caught by the frosts that occurred occasionally, from the first up to the end of that month. The Japan plums are the greatest sufferers, as they bloom very early, and even if there is no frost, the weather which is frequently wet and cold, appears to prevent the fertilization of the blossoms. Very seldom has there been more than a very light crop of these varieties, while the trees make a healthy growth, and are very profuse bloomers. The few plums they do bear are as a rule very irregular in size, ranging from very small up to very large.

The plum rot was very generally prevalent, and the orchard at Agassiz suffered rather severely, only a few varieties being entirely or nearly exempt from the disease. The following are some of the most promising of the rot-resisting class, these being either entirely free or very nearly free from it. Belgian Purple, Diamond, Goliath, Sultan, Mallard, Lincoln, Cochet, Clyman, Grand Duke and Monarch.

The following varieties fruited this year for the first time :—

Diaprée Violette (—Cheston).—Tree a vigorous grower. Fruit small, oblong; skin dark purple with a bluish bloom. Flesh yellow, firm, sweet, and of good flavour ; freestone. Season, early August.

Tatge.—Tree a strong grower, and free bearer. Fruit of medium size, oval, a little flattened at each end ; skin purple red, with a thin whitish bloom. Flesh yellow, juicy, with a pleasant flavour, moderately sweet. Season, early August.

Prince's Red Gage.—Tree a vigorous grower, and a free producer. Fruit below medium size ; skin dark red, with a thin bloom. Flesh greenish, juicy, tender, sweet, with a high flavour. Season, early August.

Blue Apricot.—Tree a strong grower. Fruit above medium size, globular ; skin reddish purple, with many golden dots, and a thick blue bloom. Flesh yellowish green ; firm, moderately juicy, sweet, and of fine flavour; stone small and free. Season, early August.

Early Tours.—Tree a vigorous, but slender grower. Fruit of medium size, oval ; skin deep purple, with a thick bloom. Flesh greenish yellow, juicy, sweet, with a pleasant flavour. Season, early August.

Royal Tours.—Tree a strong grower. Fruit above medium size, globular, with a deep suture and one side enlarged ; skin dull red, with a sprinkling of golden dots, and a thick bloom. Flesh greenish, juicy, with a pleasant flavour. Season, early August.

Norbert.—Tree a vigorous grower. Fruit small, flattish globular ; skin dark purple with a thick light blue bloom. Flesh yellowish-green ; firm, sweet, with a pleasant flavour. Season, August.

Throop, No. 1.—Tree a strong grower. Fruit large, oblong, largest in the middle, and tapering to each end, with a wide suture ; skin reddish-pink, with a whitish bloom. Flesh yellowish, juicy, sweet, with a fine flavour; free-stone. Season, August.

Bullman.—Tree a vigorous grower. Fruit above medium size, oval, with a deep suture, and one side enlarged ; skin greenish-yellow, sprinkled with small clear red dots. Flesh greenish-yellow, juicy, sweet, with a pleasant flavour; free-stone. Season, August.

Mirabelle Double.—Tree a strong grower. Fruit below medium size, roundish, flattened, skin clear, yellow with a few small bright red dots. Flesh yellow, very sweet, and rich ; stone free. Season, August.

Guthrie's Topaz.—Tree a strong grower. Fruit of medium size, with a slight neck, and one side enlarged ; skin golden yellow, with thin bloom. Flesh yellow, juicy, sweet ; cling-stone. Season, August.

Mason.—Tree a vigorous grower. Fruit small to medium ; heart-shaped ; skin yellowish red. Flesh tender, not juicy ; pleasant and sweet ; cling-stone. Season, last of August.

Caddo Chief.—Tree a vigorous grower. Fruit of medium size, oval, with a deep suture, one side enlarged; skin yellowish, with a white bloom. Flesh yellowish, not juicy, sweet, with a pleasant flavour ; cling-stone. Season, last of August.

Chabot.—Tree a vigorous grower. Fruit of medium size, roundish ; skin red. Flesh yellowish, not juicy, moderately sweet, with a pleasant flavour. Season, last of August.

Bijonnier.—Tree a vigorous grower. Fruit small, oval, with a broad suture; skin pale yellow, with a thin bloom. Flesh greenish-yellow, sweet and juicy, with a pleasant flavour ; free-stone. Season, last of August.

Boddaert's Reine Claude.—Tree a vigorous grower. Fruit above medium size, roundish oblong. Skin pale greenish-yellow, mottled, with patches of green. Flesh whitish-yellow, juicy and sweet, with a pleasant flavour. Season, last of August.

White Honey Damson.—Tree a vigorous grower. Fruit small, oval. Skin pale yellowish-white. Flesh yellowish-white, juicy, and sweet, with a pleasant flavour. Season, early September.

Rangheri's Mirabelle.—Tree a vigorous grower. Fruit below medium size, roundish, with a shallow suture. Skin pale yellow. Flesh yellow, juicy, sweet, with a rich flavour ; free-stone. Season, early September.

Jerusalem.—Tree a stronger grower. Fruit above medium size, oblong egg-shaped. Skin dark purple, with a thick blue bloom. Flesh firm, sweet, moderately juicy, with a pleasant flavour ; free-stone. Early September.

Queen of Mirabelles.—Tree a strong grower. Fruit small globular. Skin yellow, with a thin whitish bloom, and a few reddish dots and spots near the stem. Flesh yellowish, juicy, and sweet, with a pleasant flavour ; cling-stone. Season, last of September.

Giant Prune.—Tree a vigorous grower and fruit bearer. Fruit above medium size, oblong oval. Skin light reddish purple, with a thin bloom. Flesh yellow, medium juicy and sweet, with a pleasant flavour ; stone not quite free. Season, September.

Stanton.—Tree a vigorous grower. Fruit medium size, oval. Skin dark purple, with a reddish bloom. Flesh yellowish green, sweet and juicy, with fine flavour. Season, September.

Golden Beauty.—Tree a free grower but a poor bearer. Fruit small, heart-shaped. Skin golden red. Flesh deep orange, not very juicy, flavour pleasant. Season, September.

CHERRIES.

The cherry trees bloomed very profusely in the spring, set fruit well and gave promise of an abundant crop. When the fruit was about half grown, it was expected the crop would aggregate nearly, if not quite, one and a half tons, but when the earlier sorts began to colour rot attacked them and the continuous rains favoured the rapid development of the disease, so that trees which promised a fine crop produced very little merchantable fruit. The following varieties fruited for the first time this year:—

Willis' Early.—Tree a strong and vigorous grower. Fruit of medium size, obtuse, heart-shaped. Skin yellow, mottled with light red and a few golden dots. Flesh yellowish-white, juicy, tender and sweet. Ripe early in May.

Kassin's Early.—Tree a vigorous grower. Fruit of medium size, roundish heart-shaped. Skin dark glossy red. Flesh and juice deep red. Flesh firm, juicy and sweet, with a pleasant flavour. Ripe middle of May.

Crown Prince.—Tree a strong grower. Fruit above medium size or nearly large heart-shaped. Skin yellow, with a light red blush. Flesh whitish, juicy, tender, refreshing. Quality, good. Ripe last of May.

Duchess of Angoulème.—Tree a strong grower. Fruit small, round. Skin dark, glossy red. Flesh yellow, tender, juicy and with a sprightly pleasant flavour. Ripe early in June.

Werder's Early Black Heart.—Tree a vigorous grower. Fruit large, roundish, heart-shaped. Skin black. Flesh dark red, tender, juicy, sweet and good. Ripe early in June.

Ox-Heart.—Tree a vigorous grower. Fruit large, obtuse, heart-shaped. Skin dark red. Flesh tender and juicy, with a pleasant flavour. Ripe early in June.

Spanish Black.—Tree a vigorous grower. Fruit of medium size ; heart-shaped, irregular. Skin dark, glossy, purple. Flesh dark red, tender, juicy, rich and sweet. Ripe middle of June.

Von der Natte.—Tree a vigorous grower. Fruit medium to large, roundish. Skin glossy red. Flesh red, juicy, sprightly and of pleasant flavour. Ripe late in June.

Gros Gobet.—Tree a feeble grower. Fruit above medium size, round and flattened at top and base. Skin bright, glossy red. Flesh yellowish, juicy, slightly acid. Ripe late in June.

Tradescant's Black Heart.—Tree a vigorous grower. Fruit large, heart-shaped, with an irregular surface. Skin, glossy black. Flesh firm, moderately juicy, dark red, with a pleasant flavour. Quality good. Ripe late in June.

PEACHES.

The peach crop was, with the exception of the Amsden June, almost an entire failure this year. The trees were carefully sprayed with Bordeaux mixture before the buds opened and again twice after the blossoms fell, they were, nevertheless, very badly affected with the curl leaf. The constant rains continuing throughout the spring and early summer was favourable for the development of fungous diseases, and most of the peach and nectarine trees were ruined by the curl leaf, as the foliage fell and new leaves formed they in turn became diseased and fell off.

NECTARINES.

These were even greater sufferers than the peach trees. They have never borne any large crops, a few specimens of poor fruit being the most they have ever produced.

APRICOTS.

The Acme apricot is the only variety among those tried here that has ever borne more than a few specimens. It is a fairly good apricot and has borne three small crops, but the tree is tender, large limbs dying from time to time, and this year the whole tree died. Nearly all the other varieties of this fruit were affected in the same way, although they did not bear fruit, and quite a collection of seedlings which grew well for a year or two have died piecemeal. The peach, apricot and nectarine are not adapted to exposed locations in this locality.

MEDLARS.

All the varieties of this fruit, seven in all, fruited this year. The bloom does not open until late, generally well on in May, and escapes frost and always sets its fruit. Since these trees began fruiting none of them have missed a crop. The variety called Giant is the largest fruited, and the Nottingham the smallest, but the difference is not great, and in other respects there is not much to choose in the quality or merits of the different sorts.

QUINCES.

None of the quinces bore fruit this year. Several of the trees blossomed and look healthy, but they do not set fruit.

MULBERRIES.

All of the named varieties of the mulberries fruited freely this year, as they always do. Several seedling trees have grown to a considerable size, but have not borne any fruit. This fruit does not appear to have any insect or fungous enemies. It is too soft for shipment, but is pleasant to eat off the tree, and is used in a number of ways, and as the fruit commences to ripen early in July and continues to the last of September, a tree or two are a useful addition to the home supply of fruit. As tested here there is not much choice between Downing, Hicks, or New American, all are meritorious.

GRAPES.

The grapes this year have been almost a total failure. A few varieties fruited, but in every case the bunches were open, many of the berries small and very many of them had been cut into or holes gouged in the skin by the cut-worms. Those sorts which produced a few clusters of ripe berries, ripened in the order named, Jessica, Saunders' No. 4, Delaware, Moyer.

GOOSEBERRIES.

The gooseberry bushes were sprayed with Bordeaux mixture early in the spring before the buds opened, again just after the leaves began to form and after blooming, and once again later in the spring, but perhaps partly owing to the frequent showers which so often wash the mixture off before it has time to effect the purpose for which it is applied, or from some other cause, mildew was not subdued this season.

The few bushes planted on the upper bench lands are practically free of the disease, and have never been sprayed.

STRAWBERRIES.

The strawberry crop has not been quite as good this year as usual. Twice during the winter the plants were badly heaved by frost which came immediately after heavy rain when the soil was filled with water. Then during the blossoming period there was light frost and a deal of cold rain which prevented the fertilizing of the flowers, and heavy continuous rains during the ripening injured the crop.

STRAWBERRIES.

Name.	Date of Ripening.	Growth of Plant.	Size of Berry.	Quality.	Productiveness.
Arrow	June 2	Vigorous ...	Medium......	Firm; long thimble shaped; glossy red; a little acid; good flavour.	Productive.
Dayton . ..	" 2	" ...	Large medium	Firm, deep red, sweet, good flavour.	"
Chairs	" 2	" ...	" .	Firm; sweet, good flavour....	"
Omega	" 3	" ...	" .	Firm; berry conical bright red; sweet, good flavour; one of the best.	"
Weston........	" 3	Moderately vigorous.	Small	Fairly firm; conical dark red; a little acid; fair flavour.	Moderately productive.
Tennessee Prolific.	" 4	Vigorous ...	Large	Firm; long conical bright glossy red; a little acid; good flavour.	Productive.
Anna Kennedy.	" 4	" ...	Large medium	Firm; roundish conical, glossy red; sweet, good flavour.	"
Bissel	" 4	" ...	Very large....	Rather soft; irregular in shape; bright red; good flavour.	"
H. W. Becher..	" 4	" ...	Large	Firm; light red; sweet, good flavour.	"
Eleanor.	" 5	Moderately vigorous.	Small	Moderately firm; round, dark red; sweet, fine flavour.	Moderately productive.
Iowa Beauty...	" 5	Vigorous ...	Large	Firm; very good quality......	Productive.
Van Deman ...	" 5	" ...	Large medium	Firm, conical, dark red; a little acid; good flavour.	"
Maxwell.	" 5	" ...	Medium......	Firm, round conical, bright red; sweet, good flavour.	"
Greenville	" 5	" ...	Large medium	Firm, round, bright red; even size; very good.	"
Alpha.........	" 5	Moderately vigorous.	" .	Firm; of fairly good quality..	Moderately productive.
Mary..........	" 5	Vigorous ...	" .	Firm, clear pale red; sweet, good flavour.	" ..
Timbrell.......	" 6	" ...	Medium......	Firm; good quality.........	Not productive.
Empress Eugenie.	" 6	Moderately vigorous.	"	Firm; sweet, good flavour....	Moderately productive.
Bonny Lass....	" 6	" ..	"	Firm; sweet, good flavour....	" ..
Warfield.......	" 6	Vigorous ...	"	Firm, dark red, sweet; very good quality.	Productive.
Crockett's Choice.	" 6	" ...	Small	Firm, long, conical, dark red, juicy; sweet, fine flavour.	Not productive.
Brandywine....	" 7	Moderately vigorous.	Large medium	Firm, conical, dark red; fine flavour.	Moderately productive.
Laxford Hall..	" 8	Vigorous ...	Medium......	Firm, long, conical, clear red; good flavour.	Not productive.
Windsor Chief.	" 8	" ...	Large medium	Firm; a little acid; very good flavour.	Productive.
Sir Joseph Paxton.	" 8	Moderately vigorous.	Medium	Firm; fair quality...... .. .	Moderately productive.
Dr. Hogg	" 9	Vigorous ...	"	Firm; sweet, good flavour....	" ..
Imp. Jucunda .	" 10	" ...	Large medium	Firm; bright red; sweet, good flavour.	Productive.
British Queen..	" 11	" ...	Large	Firm, roundish conical, dark glossy red; sweet, fine flavour.	"
Michigan	" 14	" ...	Very large....	Firm; uneven in shape and in ripening; only fair flavour.	Not productive.
Arkansas Traveller	" 14	" ...	Large	Firm, conical, dark red; sweet fine flavour.	Productive.
Magoon	" 15	" ...	"	Firm, bright red; sweet, good flavour.	Moderately productive.

RED AND WHITE CURRANTS.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
La Turinese (red)	June 21	Vigorous....	Medium......	Cluster medium in length, well filled good quality.	Productive.
Fay's Prolific (red)	" 21	"	Large........	Cluster long, well filled good quality.	"
Large White Brandenburg.	" 21	"	"	Cluster long, well filled, sweet, good flavour, very fine.	"
White Kaiser.	" 21	"	Large medium	Cluster long, but not very well filled, good quality.	"
New Red Dutch	" 21	"	" .	Cluster medium in length, well filled, good quality.	"
White Pearl. ..	" 21	"	Medium......	Cluster medium in length, not very well filled, good flavour.	"
Victoria (red)...	" 22	" ...	Large.... ...	Cluster long, moderately well filled, good flavour.	"
Knight's Early Red.	" 22	"	Small........	Cluster short, fairly well filled, good flavour.	Moderately productive.
Prince Albert (red)	" 22	"	Large medium	Cluster long, moderately well filled, good flavour.	"
Chenonceau (red)	" 22	"	Very large....	Cluster long, well filled, sweet, fine flavour.	Productive.
Beauty of St. Giles (red)	" 22	Moderately vigorous.	Large.... ...	Cluster long, well filled, good flavour.	"
Moore's Ruby..	" 23	" ..	Small........	Cluster medium in length, not well filled, acid, good flavour.	Not productive.
Versailles (red).	" 23	Vigorous....	Medium .	Cluster medium in length, well filled, good flavour.	Moderately productive.
Eyatt's New White (yellowish)	" 23	"	Large medium	Cluster long medium, fairly well filled, good flavour.	Productive.
White Cherry (yellowish)	" 23	"	" .	Cluster long, well filled, sweet, good flavour.	Moderately productive.
Large Red	" 23	" .. .	Medium......	Cluster long, moderately well filled, good flavour.	"
White Grape ..	" 23	"	Large medium	Cluster long, well filled, good quality.	"
Admirable (red)	" 23	Moderately vigorous.	Large........	Cluster long, well filled, good quality.	"
English Red ...	" 24	Vigorous....	Large medium	Cluster long, well filled, good quality.	Productive.
Ringen's Red..	" 24	"	Small........	Cluster medium in length, fairly well filled, good flavour.	"
Verrier's White	" 24	"	Large medium	Cluster long, not very well filled, good flavour.	Moderately productive.
White Champaigner	" 24	"	Small........	Cluster long medium, fairly well filled, good flavour.	"
Frauendorfer (red)	" 25	"	Large	Cluster long, well filled, good flavour.	"
Red Gondoin..	" 25	"	Small........	Cluster short, not well filled, poor quality.	Not productive.
Large White Dessert	" 25	"	Large........	Cluster long, well filled, acid, good flavour.	Moderately productive.
Raby Castle (red)	" 26	"	"	Cluster long, well filled, good flavour.	Productive.
London Red...	" 26	"	Large medium	Cluster long, fairly well filled, sweet, good flavour.	"
La Hative (red)	" 26	"	Medium......	Cluster medium, fairly well filled, sweet, good flavour.	"
Red Cherry....	" 26	"	Large........	Cluster long, moderately well filled, quality fair.	"
Large White...	" 26	"	Large medium	Cluster medium in length, well filled, good flavour.	"
Red Dutch	" 26	"	Medium.....	Cluster medium, well filled, acid, but good flavour.	"
White Dutch..	" 26	"	"	Cluster medium in length, well filled, acid, good flavour.	Not productive

RED AND WHITE CURRANTS—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
North Star (red)	June 26	Vigorous....	Medium......	Cluster long medium, not well filled, good flavour.	Productive.
White English (yellowish)	" 26	Moderately vigorous.	" ..	Cluster medium in length, not well filled, good flavour.	Not productive.
Red Champaigner.	" 28	Vigorous....	"	Cluster long, fairly well filled, acid, but good flavour.	Productive.
La Conde......	" 29	"	"	Cluster medium in length, not well filled, good flavour.	Moderately productive.
White Gondoin.	" 29	"	Small	Cluster short, fairly well filled, sweet, good flavour.	Not productive.
Red Langtraubige.	" 29	"	Large	Cluster long, well filled, good flavour.	Productive.

BLACK CURRANTS.

Ruler..........	June 20	Vigorous....	Medium......	Cluster medium in length mild sweet, good flavour.	Moderately productive.
Sterling........	" 20	"	"	Cluster medium in length, flavour a little rank.	"
Gewohnliche...	" 21	" ..	Large	Cluster short, mild sweet, good flavour.	"
Victoria. ...	" 22	"	"	Cluster long medium, sweet, fine flavour.	Productive.
Ambrafarbige..	" 22	"	"	Cluster medium in length, mild, good flavour.	Moderately productive.
Lennox........	" 22	"	Medium......	Cluster long medium, fairly good flavour.	"
Star.....	" 22	"	"	Cluster medium in length, pleasant, sweet, good flavour.	"
London........	" 22	"	" ...:.	Cluster medium in length, good quality.	"
Success..	" 22	"	"	Cluster long, sweet, mild flavour.	"
Beauty..	" 22	"	"	Cluster short, sweet, fairly good flavour.	Not productive.
Parker	" 22	"	Small	Cluster medium in length, flavour rank.	Moderately productive.
Eclipse.... ...	" 22	"	Medium......	Cluster medium in length, quality fair.	"
Louise.	" 23	"	"	Cluster medium in length, fine sweet, good flavour.	"
Bang Up......	" 23	"	Very large....	Cluster long, medium, mild sweet, good flavour.	"
Dominion......	" 23	"	Medium......	Cluster short, mild, good flavour.	"
Ethel..........	" 23	Moderately vigorous.	"	Cluster medium in length, acid, good flavour.	"
Black Naples ..	" 23	Vigorous....	Large medium	Cluster long, sweet, mild flavour.	"
Eagle..........	" 24	" ...	"	Cluster long, thick skin, rather rank.	"
Lanark........	" 24	"	Medium......	Cluster short, a little rank....	"
Wood.........	" 24	"	"	Cluster medium in length, fair quality.	"
Stewart	" 24	"	"	Cluster medium in length, flavour a little rank.	"
Kentish Hero..	" 24	" ...	" .. .	Cluster medium in length, acid, good flavour.	Productive.
Merveille de la Gironde.	" 24	"	"	Cluster long, medium, good flavour.	"
Middlesex.....	" 24	Moderately vigorous.	" ...	Cluster medium in length, fair quality.	Moderately productive.
Pearce	" 25	"	" ...	Cluster medium in length, sweet, mild flavour.	"

BLACK CURRANTS—*Concluded.*

Name	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Clarence	June 26	Vigorous	Small	Cluster short, fairly good flavour.	Not productive.
Oxford	" 26	"	Medium	Cluster medium in length, quality fair.	"
Norton	" 26	"	Above medium	Cluster long, mild, sweet flavour.	Productive.
Bella	" 26	"	Small	Cluster short, rank flavour.	Not productive.
Monarch	" 26	"	Large medium	Cluster long, good flavour.	Productive.
Lee's Prolific	" 26	"	"	Cluster medium in length, fairly good flavour.	"
Kentville	" 27	"	Medium	Cluster short, rank flavour.	Moderately productive.
Ontario	" 28	"	Large	Cluster long, a little rank in flavour.	"
Ogden's Black	" 28	"	Large medium	Cluster short, flavour a little rank.	Productive.
Henry	" 28	"	Medium	Cluster long, sweet, good flavour.	"
Climax	" 28	"	Large	Cluster long, fair in quality.	"
Lewis	July 2	"	Small	Cluster medium in length, good flavour.	Moderately productive.
Pomona	" 4	"	Very large	Cluster long, sweet, good quality, very fine.	Productive.
Prince of Wales	" 4	"	Large	Cluster long, sweet, good flavour.	"
Baldwin	" 4	Not vigorous	Small	Cluster short, fairly good quality.	Moderately productive.
Manitoba Wild	" 4	Vigorous	"	Cluster short, rank flavour.	Not productive.

BLACKBERRIES.

Name	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Early King	July 16.	Vigorous	Large medium	Good quality	Productive.
Minnewaska	" 17.	"	Large	Good quality, sweet	Fairly productive.
Early Harvest	" 18.	Moderately vigorous	Small medium	Fair quality	Not very productive.
Hansel	" 19.	Vigorous	Large	Very good quality.	Productive.
Early Cluster	" 21.	"	Medium	Sweet, good quality	"
Snyder	" 21.	"	Large medium	Very good quality	"
Agawam	" 22.	"	" "	" "	"
Stone's Hardy	" 23.	"	" "	Good quality	"
Erie	" 23.	"	Large	A little acid, but good quality.	"
Taylor's Prolific	" 23.	"	"	Sweet, good quality	"
Lawton	" 25.	"	Large medium	Good quality	"
Eldorado	" 23.	"	Very large	Sweet, very fine flavour, good quality	"
Wilson's Early	" 25.	"	Large medium	Good quality	"
Tecumseh	" 25.	Moderately vigorous.	Small	Not very good quality	Not productive.
Thompson's Early Mammoth.	" 27.	Vigorous	Medium	" "	"
Kittatinny	" 27.	"	Large	Acid, but good quality	Productive.
Ohmer	" 27.	"	"	Fair in quality	"
Wilson Junior	" 29.	"	Medium	Good quality	Fairly productive.
Maxwell	" 29.	Moderately vigorous.	"	Fair quality	Productive.
Oregon Ever-bearing.	July 29 to Oct. 1	Very vigorous.	Large medium	Very good quality when fully ripened.	Very productive.

RED AND YELLOW RASPBERRIES.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Hansell	June 10	Vigorous	Medium	Red, a little crumbly, sweet, good flavour.	Productive.
Thompson	" 12	"	"	Bright red, firm, good flavour.	"
Crimson Beauty	" 12	"	"	Bright red, firm, good flavour.	"
Champion	" 12	"	"	Red, soft, sweet, fair flavour.	Moderately productive.
Northumberland Fill Basket	" 14	"	Large	Dark red, firm, sweet, good flavour.	Productive.
Turner	" 14	"	Small	Red, crumbly soft, sweet.	"
Battler's Giant	" 14	"	Large	Dark red, firm, sweet, fine flavour.	"
Marlboro	" 16	"	Small	Red, soft, sweet, good flavour too small to be of commercial value.	Very productive.
Carter's Prolific	" 17	"	Medium	Red, firm, sweet, good flavour.	Productive.
Kenyon	" 18	"	Above medium	Dark red, firm, sweet, fine flavour.	"
Fastollf	" 18	"	Large medium	Bright red, firm, sweet, good quality, continues long in bearing.	"
New Fastollf	" 18	"	Large	Dark red, firm, sweet, good flavour, continues long in bearing.	"
Empire	" 18	"	Small	Dark red, sweet, fair flavour.	Moderately productive.
Carleton	" 18	"	Medium	Red, firm, sweet, good flavour.	Productive.
Sir John	" 18	"	"	Bright red, crumbly, sweet, good flavour.	Very productive.
Paragon	" 18	"	Large	Bright red, firm, fair quality.	Moderately productive.
Miller	" 18	"	Large medium	Bright red, firm, good flavour.	Productive.
Nonpareil	" 19	"	Medium	Red, crumbly, sweet, good flavour.	Moderately productive.
White Antwerp	" 20	"	Large	Yellowish white, soft, sweet.	Productive.
Franconia	" 20	"	Medium	Dark purplish red, acid, fair flavour.	"
Cariboo Wild	" 20	"	"	Some of the plants produce red berries and some yellow berries, soft, crumbly, tart, good flavour.	Not productive.
All Summer	" 20	"	Large medium	Red, firm, rich flavour, continues long in bearing.	Productive.
Belle de Fontenay	" 20	"	Large	Dark red, firm, good quality.	"
Billard's Perpetual	" 20	"	"	Clear red, crumbly, sweet pleasant flavour.	"
Lord Beaconsfield	" 20	"	"	Red, firm, sweet, very good quality.	"
Baumforth Seedling	" 20	"	Medium	Dark red, crumbly, fair flavour	"
Arnold's Hybrid	" 20	"	"	Dark red, soft crumbly, fair flavour.	Moderately productive.
Duke of Brabant	" 20	"	Large	Bright red, firm, sweet, very good quality.	Productive.
Sugar of Metz	" 20	Moderately vigorous	Medium	Yellow, soft, crumbly, sweet, not of much value.	"
Pauline	" 20	Vigorous	"	Red, firm, good quality.	"
Large Yellow	" 21	"	Large	Pale yellow, soft acid.	"
Garfield	" 21	Moderately vigorous.	Medium	Bright red, firm, good flavour.	"
R. B. Whyte	" 21	Vigorous	Large	Dark red, a little soft, good quality.	"
Muskingum	" 22	"	Large medium	Dark red, sweet, good flavour	Very productive.

RED AND YELLOW RASPBERRIES—*Concluded.*

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Brinckle's Orange.	June 22	Vigorous....	Large	Firm, sweet, good quality....	Productive.
Craig..........	" 22	"	Small	Clear red, rather soft, good flavour.	"
Sharpe	" 22	"	Large medium	Bright red, firm, sweet, good flavour.	"
Malta	" 22	"	Small	Yellow, soft, crumbly, sweet, pleasant flavour.	"
Yellow Antwerp.	" 22	"	Medium.. ...	Soft, liable to spoil on bush as soon as ripe.	"
Spineless Yellow.	" 22	"	Large	Soft, sweet, good for home use.	"
Autumn Surprise.	" 22	Moderately vigorous.	Small medium	Yellow, rather soft, sweet, fair flavour.	"
Muriel	" 23	Vigorous ..	Large medium	Dark red, firm, good flavour..	Moderately productive.
Percy	" 23	"	Large	Dark purple, firm, good flavour	Productive.
Lady Anne	" 23	"	Medium.....	Yellow, crumbly, fair flavour.	"
Golden Queen..	" 25	" ...	Large	Firm, sweet, good quality, the best yellow raspberry we have.	"
Hornet........	" 25	"	"	Dark red, firm, sweet, very good quality.	"
Prince of Wales	" 25	Moderately vigorous.	Medium......	Red, firm, sweet, fair flavour.	Moderately vigorous.
Loudon........	" 26	Vigorous ..	Large	Bright red, firm, sweet, very good quality.	Productive.
Goliath........	" 26	"	Medium.. ...	Dark red, soft, good flavour...	"
Heebner	" 28	"	Large medium	Red, firm, sweet, good flavour.	"
French Vice-President.	" 28	"	Very large....	Dark red, firm, rich flavour, very good berry.	"
Sarah	" 30	"	Medium......	Red, firm, sweet, good flavour, continues long in bearing.	Very productive.
Clarke	" 30	"	"	Red, firm, sweet, fairly good berry.	Productive.
Col. Wilder....	" 30	"	Large medium	Pale yellow, soft, sweet, pleasant flavour.	Moderately productive.
Knevit's Giant.	" 30	"	Large	Bright red, firm, good flavour.	Productive.
Chili	" 30	"	"	Light red, good quality.......	Moderately productive.
La Mercier	" 30	Moderately vigorous.	Large medium	Red, good quality...	Moderately productive.
Garnet........	June 30.	Vigorous. .	Small....	Dark purple, firm, fair flavour.	Productive.
Red Herrenhauser.	" 30.	" ...	Medium	Firm, sweet, fair flavour......	"
Queen of the Market.	" 30.	" ...	Large....	Dark red, sweet, firm, good quality, identical with Cuthbert.	"
Beehive.	" 30.	" ...	Medium......	Dark red, firm, sweet, good flavour.	Moderately productive.
Barnett.	" 30.	Moderately vigorous.	Small..	Crumbly, poor quality........	Not productive.
Cuthbert	" 30.	Vigorous...	Large........	Dark red, firm, sweet, very good quality.	Productive.
Shaffer's Colossal.	" 31	" ...	"	Dark purplish red, firm acid, good flavour when very ripe.	Very productive.
Queen Victoria.	July 1	" ...	Medium......	Red, soft, crumbly, poor quality.	Productive.
Conrath.	" 4.	" ...	Large........	Red, firm, acid, fine flavour...	"
American Yellow.	" 4.	" ...	Small....... ..	Sweet, pleasant flavour.......	"
Minnie..	" 8.	" ...	Medium... .	Purple, crumbly, acid........	"
Hudson River Antwerp.	" 8.	" ...	Small medium	Dark red, soft, sweet, not very good quality.	"

BLACK CAP RASPBERRIES.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Smith's Prolific	June 30.	Vigorous. . .	Medium......	Fairly good quality.	Productive.
Early Ohio . . .	" 30.	" . . .	" . . .	Not very good quality.	"
Nemaha	July 5.	" . . .	Large........	Fine flavour, good quality.	"
Conrath.	" 5.	" . . .	"	Good quality.	"
Lovett	" 6.	Moderately vigorous.	Medium......	"	"
Older..... ...	" 6.	Vigorous. . .	Large medium	"	"
Cromwell.....	" 7.	" . . .	Medium......	Fairly good quality.	"
Kansas.......	" 7.	" . . .	"	Sweet, good quality.	"
Palmer.......	" 7.	" . . .	"	Fairly "	"
American Yellow Cap.	" 8.	" . . .	"	Sweet pleasant flavour.	"
Ada..........	" 10.	" . . .	"	Very good quality.	"
Gregg...... ...	" 11.	" . . .	Large........	" "	"
Progress	" 11.	" . . .	"	Sweet, good quality.	"
Jackson's May King........	" 13.	" . . .	Small medium	Poor quality.	Not productive.
Hopkins.....	" 13.	" . . .	Medium.....	Good "	Productive.

ADDITIONS TO THE COLLECTIONS OF FRUITS.

The following additions have been made this year to the collections of fruits on the Agassiz Farm, either from the Central Experimental Farm or from European nurseries:—

Apples..........................	36	varieties.
Pears..........................	7	"
Plums..........................	19	"
Cherries..........................	9	"
Strawberries..........................	7	"

Nearly all of these have grown well, and are in fine condition.

METEOROLOGICAL RECORD.

Date of Highest Temperature.	Degrees.	Date of Lowest Temperature.	Degrees.	Rainfall.	Snowfall.	Sunshine.
1899.		1899.		Inches.	Inches.	Hours. M.
December 31	53	December 17	16	9·90	2½	26 30
1900.		1900.				
January 27	62	January 27 and 29	27	13·00	4	55 48
February 28	58	February 15	9	3·01	8	61 42
March 31	77	March 17	29	6·19	....	100 24
April 29	90	April 25	30	3·40	...	139 27
May 1	86	May 26	37	7·60	....	145 54
June 27	84	June 7	40	10·76	....	169 42
July 21	97	July 9	45	1·21	..	238 03
August 19	19	August 22	40	5·65	....	136 24
September 13	87	September 30	34	2·77	....	135 54
October 8	70	October 27	34	5·13	....	73 12
November 13	65	November 20	12	3·39	16	81 12
	....	....	....	72·01	30½	1,364 12
1899.	Highest. Temperature.	1899.	Lowest Temperature.	Rainfall.	Snowfall.	Sunshine. Hours. M.
July 26	96	February 3 and 4	5	58·17	41	1,110 42
1898.		1898.				
August 10	103	January 23	20	46·55	20	1,506 54
1897.		1897.				
August 16	97	November 28	10	65·95	45½	1,474 00
1896.		1896.				
June 26	95	November 27	9	63·47	75½	1,417 27

The record for the twelve months ending November 30, shows a medium sunshine total for the year, and a medium snowfall, but the heaviest rainfall since this meteorological station has been opened.

I have the honour to be, sir,

Your obedient servant,

THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS FOR THE YEAR ENDING JUNE 30, 1900.

CENTRAL EXPERIMENTAL FARM—EXPENDITURE, 1899-1900.

Live stock	$	1,161 36
Feed for stock, including veterinary services		306 72
Seed grain, seeds, trees, &c.		856 00
Implements, tools, hardware and supplies		884 60
Drainage and drain tiles		2,155 81
Manure and fertilizers for experimental plots and Hort. dept.		209 46
Travelling expenses		1,410 91
Exhibition expenses		294 28
Blacksmithing, harness supplies and repairs		335 40
Bee department		258 84
Salaries		1,920 00
Wages, farm work, including experimental work with grain and other farm crops ; also, salaries of officers in charge		6,788 03
Wages, care of stock		2,153 94
Chemical department proportion chargeable to the Central Farm		1,285 40
Botanical and Entomological department proportion chargeable to the Central Farm		1,369 11
Horticultural department, including salary of officer in charge		4,049 79
Poultry department, including salary of officer in charge		1,753 95
Forestry department and care of grounds		1,057 52
Arboretum		783 25
Distribution of trees and tree seed		89 54
Office help, correspondence branch and messenger service		3,964 93
Printing and stationery		704 02
Seed testing and care of greenhouses		977 98
Dairy department		817 42
Contingencies		511 66
Books and newspapers		145 57
Telegrams and telephones		156 74
Steers purchased for feeding experiments		2,464 00
Hogs purchased for feeding experiments		1,402 23
	$	40,268 46
LESS—Proceeds of sale of steers purchased for feeding experiments		3,842 97
	$	36,425 49

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1899–1900.

Live stock	$	85 30
Feed for stock, including veterinary services		2,241 56
Seed grain, seeds, trees, &c		360 49
Implements, tools, hardware and supplies		344 65
Manure and fertilizers		471 21
Travelling expenses		274 95
Exhibition expenses		167 23
Blacksmithing, harness supplies and repairs		111 77
Salary of Superintendent, also proportion of salaries for general work, Ottawa		2,520 00
Wages, farm work, including experimental work with farm crops		2,847 18
Wages, care of stock		1,265 38
Chemical department, proportion chargeable to each branch farm		749 83
Botanical and Entomological department, proportion chargeable to each branch farm		525 00
Poultry department		97 85
Horticultural department, including salary of officer in charge		1,172 81
Forestry department, including care of grounds		154 96
Seed grain distribution		142 50
Contingencies, including postage, $33.00; mail delivery, $97.50.		210 90
Printing and stationery		31 41
Books and newspapers		27 30
Telegrams and telephone		39 43
Steers purchased for feeding experiments		1,485 00
	$	15,326 66
LESS—Proceeds of sale of steers purchased for feeding experiments		2,315 02
	$	13,011 64

EXPERIMENTAL FARM, BRANDON, MANITOBA—EXPENDITURE, 1899-1900.

Live Stock	$ 461 98
Feed for stock, including veterinary services	110 75
Seed grain, seeds, trees, &c	89 56
Implements, tools, hardware and supplies	403 06
Travelling expenses	114 05
Exhibition expenses	145 04
Blacksmithing, harness supplies and repairs	328 08
Bee department	8 52
Salary of Superintendent, also proportion of salaries for general work, Ottawa	2,520 00
Wages, farm work, including experimental work, with farm crops, &c	3,320 98
Wages, care of stock	815 25
Chemical department, proportion chargeable to each branch farm	749 83
Botanical and Entomological department, proportion chargeable to each branch farm	525 00
Horticultural department	553 14
Forestry department, including care of grounds	934 00
Poultry department	74 75
Office help, including delivery of mail, $143.00	575 86
Seed grain distribution	355 72
Tree distribution	403 46
Contingencies, including postage, $53.63	133 72
Printing and stationery	162 18
Books and newspapers	23 00
Telegrams and Telephones	40 69
Steers purchased for feeding experiments	586 00
	$ 13,434 62
LESS—Proceeds of sale of steers purchased for feeding experiments	731 02
	$ 12,703 60

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.—EXPENDITURE, 1899-1900.

Live stock	$ 40 25
Feed for stock, including veterinary services	67 63
Seed grain, seeds, trees, &c	40 88
Implements, tools, hardware and supplies	809 03
Travelling expenses	119 85
Exhibition expenses	73 00
Blacksmithing, harness supplies and repairs	219 21
Salary of Superintendent, also proportion of salaries for general work, Ottawa	2,520 00
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c	4,040 87
Wages, care of stock	865 75
Chemical department, proportion chargeable to each branch farm	749 73
Botanical and Entomological department, proportion chargeable to each branch farm	525 00
Horticultural department	189 37
Poultry department	77 80
Forestry department, including care of grounds	346 90
Office help	623 40
Seed grain distribution	354 14
Tree distribution	200 03
Contingencies, including postage, $106.01	172 48
Printing and stationery	27 45
Telegrams	12 34
Books and newspapers	6 50
Bee supplies	2 25
	$ 12,083 96
LESS—Proceeds of sale of steers	385 00
	$ 11,698 96

EXPERIMENTAL FARM, AGASSIZ, B. C.—EXPENDITURE, 1889–1900.

Live stock—registration fees	$	75
Feed for stock, including veterinary services		7 76
Seed grain, seeds, trees, etc.		404 46
Implements, tools, hardware and supplies		313 61
Manure and fertilizers		81 45
Travelling expenses		201 45
Exhibition expenses		244 84
Blacksmithing, harness supplies and repairs		108 65
Salary of Superintendent, also proportion of salaries for general work, Ottawa		2,520 00
Wages, farm work, including experimental work with farm crops, fruit trees, vines, &c		2,595 82
Wages, care of stock		439 50
Chemical department, proportion chargeable to each branch farm		749 83
Botanical and Entomological department, proportion chargeable to each branch farm		525 00
Poultry department		111 25
Forestry department		263 95
Office help		130 00
Seed grain distribution		111 32
Tree distribution		21 61
Clearing land		892 25
Contingencies, including postage, $52.96		188 62
Printing and stationery		7 80
Books and newspapers		22 00
Telegrams		1 45
	$	9,943 37

SUMMARY.

Central Experimental Farm		$ 36,425 49
Nappan "		13,011 64
Brandon "		12,703 60
Indian Head "		11,698 96
Agassiz "		9,943 37
Seed grain distribution from Central Experimental Farm		4,216 94
Printing bulletins and distribution of bulletins and reports	$ 4,000 00	
Less special sum in estimates for this item	4,000 00	
		$ 88,000 00

SUMMARY OF STOCK, MACHINERY, IMPLEMENTS, &c., ON HAND DECEMBER 31, 1900.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

15 Horses	$ 1,360 00
4 Ayrshire cattle	340 00
4 Guernsey cattle	325 00
25 Grade cattle	677 00
10 Yorkshire swine	147 00
3 Berkshire swine	67 00
6 Tamworth swine	53 00
40 Grade swine	240 00
9 Shropshire sheep	210 00
13 Leicester sheep	226 00
13 Grade sheep	43 00
Farm machinery and implements	2,763 50
Vehicles, including farm wagons and sleighs	1,058 00
Hand tools, hardware and sundries	1,068 35
Harness	302 90
Dairy department, machinery, &c	625 00
Horticultural and Forestry departments, implements, tools, &c	589 65
Botanical department, implements, tools, &c	11 00
Poultry department, 236 fowls	223 00
Poultry department, implements, furnishings, &c	115 45
Bees and apiarian supplies	413 95
Chemical department, apparatus and chemicals	2,100 00
Books in several departments	495 85
Greenhouse plants, supplies, &c	1,482 00
Furniture at Director's house	1,253 85
Office furniture and stationery	1,529 00
	$ 17,719 50

EXPERIMENTAL FARM, NAPPAN, N.S.

7 Horses	$ 765 00
4 Guernsey cattle	450 00
5 Holstein cattle	450 00
6 Ayrshire cattle	350 00
32 Grade cattle	1,124 00
2 Yorkshire swine	35 00
2 Berkshire swine	40 00
3 Tamworth swine	38 00
63 Grade swine	270 00
49 Sheep	201 00
41 Fowls	23 75
Bees and apiarian supplies	37 95
Vehicles, including farm wagons and sleighs	365 00
Farm machinery	510 00
Farm implements	223 00
Hand tools, hardware and sundries	474 60
Harness	219 00
Furniture for reception room and bedroom for visiting officials	173 50
Furniture supplies and books for office	92 00
	$ 5,571 80

EXPERIMENTAL FARM, BRANDON, MANITOBA.

12 Horses	$ 1,035 00
5 Ayrshire cattle	240 00
6 Durham cattle	720 00
1 Guernsey bull	100 00
4 Holstein cattle	125 00
6 Grade cattle	115 00
1 Chester White swine	15 00
10 Tamworth swine	85 00
6 Berkshire swine	50 00
2 Yorkshire swine	22 00
7 Grade swine	14 00
50 Fowls	50 00
Bees and apiarian supplies	105 05
Vehicles, including farm wagons and sleighs	497 00
Farm machinery	927 00
Farm implements	630 00
Hand tools, hardware and sundries	585 27
Harness	213 50
Furniture for reception room and bedroom for visiting officials	161 55
Furniture supplies and books for office	282 40
	$. 5,972 77

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

13 Horses	$ 1,230 00
1 Ayrshire bull	75 00
12 Durham cattle	945 00
1 Guernsey bull	70 00
18 Grade cattle	465 00
4 Berkshire swine	60 00
2 Tamworth swine	30 00
62 Fowls	36 50
Bees and apiarian supplies	33 75
Vehicles, including farm wagons and sleighs	475 00
Farm machinery	1,191 00
Farm implements	685 00
Hand tools, hardware and sundries	414 50
Harness	178 00
Furniture for reception room and bedroom for visiting officials	168 50
Furniture supplies and books for office	219 90
	$ 6,277 15

EXPERIMENTAL FARM, AGASSIZ, B.C.

6 Horses	$ 520 00
3 Durham cattle	240 00
17 Grade cattle	464 00
9 Dorset horned sheep	75 00
2 Berkshire swine	45 00
12 Tamworth swine	85 00
8 Grade swine	30 00
39 Fowls	37 00
Bees and apiarian supplies	35 95
Vehicles, including farm wagons	230 00
Farm machinery	558 00
Farm implements	156 00
Hand tools, hardware and sundries	167 85
Harness	45 05
Furniture for reception room and bedroom for visiting officials	188 90
Furniture supplies and books for office	156 25
	$ 3,034 00

W. H. HAY,
Accountant.

INDEX

49

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P

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